

A Tested Scheme for Creating the Filipino Science Vocabulary

Bienvenido T. Miranda

*National Research Council of the Philippines*¹

1. Introduction

The Commission headed by Director Ponciano B. P. Pineda describes Filipino in terms of what it is at present, which is essentially a current version of what, in 1937, was promulgated in an Executive Order by then President Manuel L. Quezon, on the authority of the 1935 Constitution.

The infusion of new words into the core language, Tagalog, has been left largely to circumstances, hence extremely slow. If scientific discourse in Filipino is to flourish in a semantically respectable way, a functional wordlist must be drawn up via a deliberate search for science terms. This was the idea behind the scheme within which a scientific vocabulary of nearly 8,000 entries has been gathered. They have been published in two volumes, one in 1980 and the second in 1992.

In keeping with the spirit of the word "national" in the term National Language, I have abided by the self-imposed mandate that the Vocabulary be unmistakably Philippine in character. And so it is, but without being semantically parochial.

2. The Search

The search starts with English scientific terms culled from assorted sources. For the Filipino equivalents, first priority goes to existing words in Philippine languages, principally Tagalog. To fill up gaps in the Vocabulary, words are coined by combining Philippine words or parts thereof. In both approaches, the guiding principle is meaning-orientedness. The sense of the English original must be reflected in the Filipino equivalent. If the English word has two disparate meanings two Filipino versions are sought to distinguish them.

Other important considerations in the choice of terms are brevity, euphony, suggestiveness of meaning, amenability to grammatical derivation, established usage, and self-consistency.

The author is well aware that, notwithstanding nationalistic motives, scientific terminology can not be totally Philippine. Foreign words make up a sizable part of the Vocabulary. The proportion is actually higher than what the two-volume list shows, considering that many English words, for example names of chemical compounds, which are adopted as Filipino are not listed because there are millions of them. However, it is safely estimated that a scientific discourse, even on chemistry, will contain at most 25% foreign terms whose inclusion are only for sound reasons.

¹ The National Research Council of the Philippines was established by Law in 1933. Its Headquarters is in Bicutan, Metro Manila.

3. Elements of the Scheme—Illustrative Examples

3.1 Ready-made Philippine Words

a) Tagalog:

- i) These are words in common use, or found in published dictionaries, e.g., those of the former Surian ng Wikang Pambansa (Institute of National Language), of Dr. Jose Villa Panganiban, Father Leo James English, and Mr. Vito C. Santos. Limited use is made 19th century lexicons by Pedro Serrano Laktaw and by Juan de Noceda.

Examples: **puso** 'heart', **hangin** 'air', **agham** 'knowledge'.

- ii) Colloquial, archaic, slang and other words generally shunned in genteel society are pressed into service.

Examples: **ulop** 'fog', **dagitab** 'electricity', **bakla** 'hybrid', **asar** 'repellent'.

b) Non-Tagalog—Considerations for Their Inclusion:

- i) Terms not found in Tagalog.

Example: **Bana** 'husband' is Visayan.

- ii) Alternative to disparate meanings of a Tagalog word.

Examples: **Araw** is Tagalog for 'sun' as well as for 'day'. To distinguish them, the Vocabulary lists **araw** for 'day', but **adlaw** (Visayan) for 'sun'. Accordingly, the astronomical term 'solar day' is **adlawing araw** (the suffix **-ing** is explained further on). **Lamán** is Tagalog for 'muscle' as well as for 'contents'. To distinguish them, **lasag** (Ilokano) is listed for 'muscle'.

3.2 Ready-made Foreign Words—Considerations for Their Inclusion

a) Latin:

- i) Names of ten chemical elements, to fit the internationally-used symbols.

Examples: **natrium** (symbol Na) for the English 'sodium' (Na also); **aurum** (Au) for 'gold'. The Tagalog **ginto** is used in non-chemical contexts; e.g., **mina ng ginto** 'gold mine'. The other eight elements are **kalium** (K), **ferrum** (Fe), **cuprum** (Cu), **argentum** (Ag), **stannum** (Sn), **stibium** (Sb), **plumbum** (Pb), and **hydrargyrum** (Hg).

- ii) International names of plants and animals.

Examples: **chanos chanos** for 'milkfish'. The Tagalog **bangus** is used when the scientific name is not necessary. **Cocos nucifera** is used for 'coconut', when necessary.

b) English:

- i) Names of the remaining (about 96) chemical elements, in the original spelling, if similar enough to the international symbols.

Examples: **oxygen** (O) instead of the Latin **oxygenum**; **wolfram** (W) instead of **wolframium** or **tungsten**.

- ii) Names of chemical compounds, in the original spelling, except where the element in the compound has to be in Latin, as explained in 3.2,a),i) above.

Examples: **aluminum phosphate** (AlPO₄); **natrium chloride** (NaCl).

- iii) Terms for which there are no known equivalents in Philippine languages, and when there is no conceivable advantage of coining any.

Examples: **anti-mutagenic**, **plasma**

- c) Spanish:

Terms in common use, with optional orthographic modification.

Examples: **teoria antomica** / **teorya atomika** for 'atomic theory'; **hasoge** (Hg) for the element 'mercury'. This is an adaptation of the Spanish **azogue** 'mercury'. The Latin **hydragyrum**, cited above, is difficult to pronounce.

- d) Other Foreign languages:

Other foreign terms are included in the Vocabulary, with or without change in spelling, if there are good reasons for doing so.

Examples: **Buram** 'opaque' is Indonesian; **lahar** 'mudflow' is Indonesian; **tsunami** 'tectonic wave' is Japanese; **wolfram**, cited above, is German for 'tungsten'. **Kemi** 'chemistry' is an adaptation of the German **chemie** (pronounced "kemi"). It is explained below.

3.3 Coined Philippine Words

3.3.1 Rationale

This aspect of the scheme is controversial; some people oppose it. Whatever their reasons, I continue coining because it is a productive way of creating terms that are what I want them to be, namely, unmistakably Philippine, self-explanatory, short, euphonious, and amenable to grammatical transformation. Moreover, many of the English terms are themselves coined, such as **radar**, **laser**, and **smog**. **Ichthyofauna** and **fissiparous** are from Latin and Greek sources. I coin only from local words.

3.3.2 Tagalog Affixes as Instrument of Coining

Coining is helped by the use of standard affixes. Those included in this paper are the suffix **-in** which transforms a noun to an adjective. Thus, **adlaw** 'sun' becomes **adlawin** 'solar'. The suffix **-ing** is used when the adjective stands directly before a noun; thus, **adlawing araw** 'solar day'. The suffix **-an** inflecting a word produces another that connotes location of an object, and site or mode of an action. Thus, **bigas** 'rice' becomes **bigasan** 'rice bin'. **Di** is a contraction of **hindi** 'no / not', and is used as a negating prefix. The prefix **ka-** has myriad uses, and is found in the noun forms of many verbs.

3.3.3 Method by Joining

- a) Joining two full words. The limit to two is desirable, not mandatory.

Examples: **aral-ibon** 'bird study' is **ornithology**.
aral-isda 'fish study' is **ichthyology**.
ayaw-hamog 'dislikes moisture' is **efflorescent**.

b) Joining one full word and a syllable from another.

Example: **Dag-balani** is 'electromagnet'. **Dag** is from **dagitab** 'electricity'; it is used as combining form for scores of words to provide the sense of 'electric', 'electro', and 'electrical'.

Example: **Dag-asaran** is 'electric repulsion'. Note that **asar** 'repellent' is transformed by the suffix **-an** (see 3.3.2). **Mun-akit** is 'earth's gravity'; **mun** is from **mundo** 'earth'; **akit** is 'attraction'.

c) Joining one syllable from each of two, or more, words.

Example: **Sunlad** is 'evolution'. **Sun** and **lad** are syllables from the phrase **sunod-sunod na pagunlad** meaning 'successive developments'. The meaning of the coined word is not immediately obvious, hence this method is rarely used—usually as a concession to personal whim.

Example: **Paslab** is 'driveway'. **Pas** and **lab** are from the phrase **pasukan at labasan** 'entry and exit'. It was inspired by the existing word **taklab** 'farmer's hut'. If for nothing else, such words are not as outlandish as the anonymously-coined **tap-si-log** 'native breakfast fare', or **ti-may-ul-s-git** 'sandwich' which have become popular.

3.3.4 Method by Shifting Accent Mark

Examples: The Tagalog **lusáw** means 'molten'. A variant, **lúsaw**, is set to mean 'liquid' (noun), i.e. 'matter in the molten state'. The shifting of accent marks to produce a different, usually related, meaning is standard in Tagalog. Thus, **súkat** 'measurement' becomes **sukát** 'measured'; **dáing** 'jerked fish' becomes **daíng** 'lamentation'.

3.3.5 Method by Extraction from Existing Words, Plus Re-accenting

Example: The Tagalog **kalúlasan** means 'solution of a problem'. **Lútas** is extracted and set to mean 'solution of a mathematical equation', e.g., the numerical value of X in $X^2 = 10$. This distinguishes it from the existing words **lutás** 'solved'. (The Tagalog **tunáw** means 'dissolved'. The variant **túnaw** is set to mean 'chemical solution', distinct from **lútas** meaning 'mathematical solution'. Two disparate meanings for the same word is avoided.)

Example: The Tagalog **buhaghag** means 'loosely aggregated'. **Búhag** is extracted and set to mean 'gas - that state of matter wherein the component molecules/atoms are separated from each other'. (**Gas** itself can not be adopted because it already means 'kerosene' in Tagalog.) **Búhagin** is gaseous (see 3.3.2).

3.4 Other Considerations

3.4.1 Honorific Intent

Many English terms include a person's name by way of honoring him/her. The Filipino equivalent retains that intent.

Examples: **Sunogang Bunsen** 'Bunsen burner', in honor of R.W. Bunsen. **Sunog** 'to burn' is converted to 'burner' by **-ang**. **Tagasang Fallopius** 'Fallopian duct', in honor of G.Fallopius. **Tagas** 'to leak/flow' is converted by **-ang**.

3.4.2 Mathematical Symbolism

In technical literature, standard mathematical symbols for scientific concepts are time-honored. For example, the symbol is *S* for 'entropy'. Whenever possible, the Filipino equivalent chosen begins with that letter. Thus, 'entropy' is *salimuot* which means 'chaos or complexity'. Those literal meanings happen to be physical versions of the mathematical concept called 'entropy'.

My field being chemistry, I would like to devote a paragraph to why I chose *kemi* rather than the widely used Spanish *quimica/kimika*. *Kemi* is amenable to grammatical transformations. Thus, *kemiin* is the adjective 'chemical'. *Di-kemiin* is 'non-chemical'. The German chemists are world-class, whose terminology is worth adapting. *Kimiko* is 'chemist'. (*Kimika* can be 'woman-chemist, if the ladies want to be singled out'.)

This brings me to "sex". I did not adopt that popular word because we have our very own *sari*. It can be smoothly transformed to *sariin* 'sexual', and *di-sariin* 'asexual'. Other euphonious derivatives are *aral-sari* 'sexology', *sarian* 'sexual relations', *kasarian* 'gender', *sang-sari* 'unisex', and *makasari* 'sexist'. Long before "hermaphrodite" became a byword in this country last June (1992), my Vocabulary already had a word for it, viz., *dal-sari*, from *dalawa ang sari* (two sexes). The poor radio announcer then was fruitlessly groping for a Tagalog equivalent but I could not help him because I had no telephone.

4. Conclusion

I would express my fear that the widespread use of Filipino in scientific discourse is still remote, although I sincerely hope the trend will be evident in my lifetime. In any case, I want to be ready not only with a scheme, not only with a Vocabulary, but also with some full-length works. Two of them are worth mentioning: 1) *Pangkabataang Ensayclopeida sa Agham at Techonolohiya* (Junior Encyclopedia for Science and Technology) of which I am a contributor, translator, and editor, and the *Kemi Para sa Mataas na Paaralan* (High School Chemistry) which I am currently writing. Both are scheduled for completion in 1993.

I would add, further, that even as I am propagating Filipino, I do not want our use of English to decline one whit. That is why I am vehemently opposed to respelling of English words to suit the peculiarities of our speech. I consider it an unconscionable exercise of option to include as Filipino such words as *bayolodyi* 'biology', *pisiks* 'physics', *sayans* 'science', *arkayb* 'archive', *barayti* 'variety', and many more of the kind. I submit that every English word has audio and video character which must both be respected by the communicator. If English is to remain our window to the world, we must never confuse its standard orthography. It is bad enough that we mispronounce some English words; it is worse if we misspell them as well for the sake of convenience. Such practices will open the floodgates of disfigured English words into Filipino. How then can the latter be the Philippine National Language?

By way of adding a bit more body to this sketch, there are appended a translation of "The Incredible Universe" by K.F. Weaver (see Appendix 1) and some detail on 'etymology', a 60-word sampling of the Vocabulary (see Appendix 2).

APPENDICES

Appendix 1: ANG KAGILAGILALAS NA SANSINUKOB

Salin ng "The Incredible Universe"

K. F. Weaver

Sa mula't mula pa ang tao ay humanga na sa kalangitan (heavens). Ngunit gaano mang pagtatanong niya ng 'Ano Ang sansinukob (universe) at ano ang nagpapaandar dito?' wala siyang natarol ukol sa katutuan (nature) ng mga bituin. Sinikap na lamang niya na maitala ang naaabot ng kanyang payak na paningin (naked eye) na mga 6,000 bituin. Hindi niya alam na ang adlaw (sun) ay isang bituin na naglalagablab sa matinding raniag (radiation) dahil sa silabang atomika (atomic furnace) sa kailaliman nito. Hindi rin niya tanto na ang mga planeta, sa kabila ng kanilang kaliwanagan, ay hindi bituin kundi maliit at madilim na bagay na kumikislap lamang sa pagpatalbog ng liwanag bituin.

Sa kanyang kawalang-malay, inilagay ng tao ang kanyang sarili at tanging planeta sa gitna ng mabituang sansinukob. Si Copernicus ay nangahas na humamon sa aral na ito na aprobado ng Simbahan. Ang mundo ay lumiligd sa adlaw, ang sabi niya, hindi kabaligtaran.

Ang simulaing iyon ay malalim at nakababaha; hindi lamang isang tao ang sinunog dahil sa paniwala doon. Ngunit iyon man ay malayo pa rin sa katutuhanan pagka't inilagay ang adlaw sa gitna ng bagay-bagay (things). Ang maling akala na iyan ay nanatili sa isipan ng tao hanggang pagdating ng kalarawan (photography) at malalaking teleskopyo nuong ika-20 daantaon (20th century).

Kalahating daantaon-lipas lamang, ang astronomong Amerikano, si Edwin Hubble, ay nagpatutoo na ang ilang kalabuan (fuzzy nebulosities) sa kanyang kalaraw (photograph) ay hindi mga malapit na ulap ng buhag (clouds of gas) gaya ng palagay ng nakararaming astronomo. Sa halip nito, sila ay mga galaxy - mga napakalawak at marahang umiionong na katipunan ng mga bituin (congregation of stars) na hawig sa ating sarili na galaxing Milky Way. Ang kagulatgulat (stupendous) na mga 'pulo ng sansinukob' (island universes) ay malayong di-hamak sa hangganan ng ating sarili na katipunan ng bituin.

Naaalaala kong maliwanag ang aking pangigilig (thrill) nuong ang dating magaaral at katulong si Hubble, si Dr. Allan Sandage, ay magsama sa akin doon sa taguan ng mga plato (plates[photographic]) sa observatorio Hale sa Pasadena, California, at magpakita sa akin ng makasaysayang kalaraw na ginawa ni Hubble sa 100-pulgadang teleskopyo sa Mount Wilson, ilang milya palayo.

Sa napakaraming bituin na 'tila isinabog na dakot-dakot na buhangin' ay may nakalitaw na mumunting kung-ano na walang hugis at paikot-ikot (tiny spiral and irregular blobs). Tila ba walang kaugnayan ang mga malabong bahid na iyon! Ngunit ang pagkatuklas sa kanilang pagiging mga galaxy ay nagbigay ng di-masukat na lawak sa ating dalumat (concept) hinggil sa sansinukob, at tuluyang sumira sa natatanging katatayuan ng adlaw at ng daigdig na tao sa sansinukob na iyon.

Ngayon, alam natin na ang mga galaxy ay karaniwang tulad ng damo sa parang. Ang kanilang* ay umaabot sa isang daang bilyon. Ang napakalaking 200-pulgadang pakinang na teleskopyong Hale (reflecting telescope) sa Palomar Mountain, ang pinakamalaking teleskopyo na panliwang (optical) ay nakakakita ng aabot sa isang milyong galaxy sa lumbo (dipper) ng Big Dipper.

Paanong mauunawaan ang di-mapaniwalaang laki ng sansinukob na puno ng mga galaxy? Ang kagilagilalas na mga agwat sa sansinukob ay nalilimi ng mga astronomo na sanib sa takna (incorporated with time interval), at ginagamit nila ang teleskopyo bilang isang kasangkapan na pantakna (time machine). Sinusukat nila ang alangaang (outer space) sa haming (unit) tinatawag na liwanon (lightyear). Ito ay agwat na natatahak ng liwanag sa isang taon, sa bilis na 186,282 milya bawa't saglit (second)-umaabot sa anim na trilyong milya.

*...kanilang bilang....

Notes on terms used:

katutuan 'Nature (of something)' distinct from **Kalikasan** 'Mother Nature'. **Tutu** is Kapampangan for 'true'. **Ka-** and **-an** are affixes.

raniag 'Electromagnetic radiation in general.' It is Ilokano 'light'.

kalaraw 'photograph' (from **kamera** and **larawan** 'likeness').

takna 'Time interval' (19th century dictionary of Juan de Noceda).

silabang 'furnace' (from **silab** = to burn fiercely, distinct from **huno** = oven - temp. 300-400 C).

lumbo 'dipper' (common usage in Laguna Province).

pakinang 'reflector', or 'by relection'. It is specific for visible light, and a special case of **talbog** = To bounce (in general).

Appendix 2: A Random Sampling from the Vocabulary

- ABSOLUTE/TEMPERATURE (KELVIN) -
Temperaturang Kelvin (in honor of Lord Kelvin).
- ACUTE ANGLE - Sihang makitid (siha = space between fingers - Panganiban dict.).
- AMPHIBIAN - Pang kati-tubig (kati = land; tubig = water body).
- ANHYDROUS - Tigam (very dry).
- AMPLITUDE - Abot-alon (abot = reach)
- ARC - Balantok (from the 19th century dictionary of Pedro Serrano Laktaw).
- AREA - Awak (from lawak = expanse; mathematical symbol A).
- ATOMIC MASS - Migat-atomika (migmat from namimigmat = heavy feeling; symbol M).
- AUTOCLAVE - Pilit-singawan (pilit = pressure; singaw = vapor; suffix -an used).
- BACKBONE - Gulugod (ordinary usage).
- BACKGROUND - Duyo (INL dictionary).
- BETA PARTICLE - Tipik beta (tipik = minute particle, JVP dictionary-thesaurus).
- BILATERAL - May dalawang gilid (with two sides).
- BIOLOGY - Aral-buhay.
- BIOCHEMICAL SUPPLEMENT - Buhay-kemiing pantulong (buhay = life; tulong = help).
- CANCELLATION (mathematics) - Hati-uli (divide again by the same number).
- CATALYST, POSITIVE - Pampabilis (bilis = speed) Negative = Pampaliwag).
- CELL, BIOLOGICAL - Selday (selda from Span. celda = cell; -y from buhay = life).
- CENTURY - Daantaon (daan = hundred; taon = year).
- CHAIN REACTION - Ibahang kabit-kabit (iba = different, suggestive of new matter).
- CHEMICAL EQUILIBRIUM (two reaction rates are equal) - Kemiing simbilisan.
- CIRCLES, CONCENTRIC - Mga bilog na isa-lundoy (isa = one; lundoy = center).
- DECOMPOSITION - Bungkagan (from bungkagin = break into pieces; suffix -an used).
- DELIQUESCENT - Takaw-hamog (takaw = greed; hamog = moisture).
- DIRECT PROPORTIONALITY - Bagayang tuwid.
- DISPLACEMENT - Pagisod (isod = move aside).
- DISSECTING NEEDLE - Karayom na panlapa (lapa = to cut up; prefix pan-).
- DRAWING, LINE - Gularaw (gu- from guhit = line; laraw from larawan = figure).
- ECOSYSTEM - Likas na asahan (likas = natural; asahan = interdependence).
- ELECTRIC CHARGE - Dagkarga (dag from dagitab = electricity).
- ELECTROCHEMICAL REACTION - Ibahang dagkemiin (iba - see CHAIN REACTION above).
- ELECTROLYTE - (Matter consisting of electrified particles) dagbanag (banag = matter, Ilk.).
- FACTOR (mathematics) - Karami (from kasamang nagpaparami).
- FACTORS (co-effectors) - Kabisa (bisa = effect; prefix ka- implies collaboration).
- FERTILE (People & animals) - Anakin (anak = offspring; suffix -in used).
- FLUID - Luhag (from lusaw - liquid; buhag = gas; that is, flowing matter).
- FLOURESCENCE - Dugtong na liwanag (dugtong = continuation; liwanag = light).
- FOCUS - Tutok (common usage).
- FOCAL LENGTH - Haba ng tutok.
- FUNDAMENTAL FREQUENCY - Batayaning dalas; (batayan = basis; suffix -ing used).
- GLASS ROD - Liwas na bubog.
- GLASS SLIDE - Lapatang bubog (lapat = pressed).
- GRADUATED CYLINDER - Sukatang bumbong (sukat - to measure; suffix -ang).
- GRAPH (figure display of quantity) - Suklaraw (suk from sukat = to measure).
- GRAVITATION (universal gravity) - Sanakit (san from sansinukob = universe).
- HEAT SUMMATION, LAW OF - Batas ng dagdaging init (dagdag = additional).
- HEMISPHERE - Hatingbulog (hati = half; bulog = sphere, from buo + bilog).
- HIGHER ORGANISM - Nangungunang may-buhay (not a transliteration; una = first).
- HORIZON - Abot tanaw.
- HORIZONTAL - Higa.
- HORIZONTAL ROW - Hanay-higa.
- HUNDRETH (0.01) - Hatingdaan (divided by 100).
- HUNDRETH (100TH) Ika-isangdaan.
- HYDRATED - Madanum (danum = water, Ilokano).
- HYBRID (biological) - Tisoy (slang).
- ILLUSION, OPTICAL - Linlang-tingin (from linlangin = to fool; tingin = to look).

IMPROPER FRACTION - **Tiwaling bahagian**
(**bahagi** = portion; suffix **-an** used).

IMPURITY (foreign material) - **Yagit**.

INCANDESCENT - **Nagbabaga** (glowing).

INCIDENCE, ANGLE OF - **Siha ng dating**
(**dating** = arrival; **siha**, see **ANGLE**
above).

LAW OF INERTIA - **Batas ng kagawian** (**gawi** =
behavior; prefix **ka-**, suffix **-an**).

LEAST COMMON DENOMINATOR - **Isa-huling**
pangilalim (**huli** = last; **ilalim** =
under).

LITHOSPHERE - **Baong bato** (**bao** = shell; **bato**
= rock) ('Sphere' refers to layer).

MAGNITUDE (brightness of heavenly body) -
Ningning (As Dimension - **sukat**).

MECHANICAL ENERGY - **Malamakinang**
sigla/enerhiya (**malamakina** =
machine-like).

MICROORGANISM - **Mikbuhay** (**mik** from
mikmik = extremely small; **buhay** =
life).

NUCLEUS - **Ubod**.

NUCLEAR - **Sa-ubod**.

NEUTRAL - **Gitnain** (**gitna** = middle).

NIMBUS CLOUD - **Dagim** (colloquial).

NOBLE GAS - **Maharlikang buhag**.

NORTH GEOGRAPHIC POLE - **Hilagang tuktok**
(**hilaga** - north; **tuktok** = top).

NORTH MAGNETIC POLE - **Hilagang**
tuktok-balani (**balani** = magnet).

NUCLEAR FISSION - **Sa-ubod na pagbaak**.

NUCLEAR FUSION - **Sa-ubod na pag-isa**.

OPTICAL POLARIZATION - **Piliwanang** (**pili** =
chosen, referring to vibrational mode).

ORBIT (of heavenly body) - **Ligiran** (from **ligid**
= to go around; suffix **-ran**).