CLEMENTS

University Studies
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GREEK AND LATIN IN BIOLOGICAL NOMENCLATURE
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Greek and Latin in Biological Nomenclature

FREDERIC E. CLEMENTS

"Nomina Veterum Graecorum et Romanorum plantis imposita laudo, ad conspectum vero Recentiorum plurium horreo. Nec mirum factum! quis enim Tyro de nominibus fuit unquam instructus? quis unquam dedit circa denominationem plantarum praecepa, demonstrationes, exempla?" Linnaeus Critica Botanica 1 1737.

The following treatise is intended to serve as a compendium of the principles of word-formation in Greek and Latin of sufficient thoroughness to enable the biologist to construct in proper manner any derivative desired. Further than this, various unfortunate usages which have obtained in nomenclature and the many types of malformations will be considered in detail, and suggestions will be made for their correction or elimination. The treatment throughout is based upon the conviction that no biologist should be content with a nomenclature that is doubtful or crude in its philology. On the other hand, ultra-purism, together with the mooted questions pertaining solely to the classical philologist, will be avoided, since nomenclature for the sake of uniformity and stability must rest upon the assured. For these reasons, also, it is felt that, while he must conform to the best usage of the language, the nomenclator must go a step further, and, in the case of uncertain or various usage, establish a definiteness which the language itself did not know. Further warrant is found for this in the fact that the careless hand of
analogy is always busy throughout the life of a language, and, also, in the fact that the lexicon must take account of all usage, with the result that the cruder derivatives of formative and decadent periods of the language are found alongside of the purer, or at least more refined forms of the classical period.

While Kuntze’s important contributions and the Rochester Code have been notable achievements on the way toward nomenclatural reform, it has been evident from the first that botanists had merely reached a temporary resting place, from which they must sooner or later go forward to the ultimate goal—a uniform and stable nomenclature and terminology of international recognition. The failure to deal with the matter of generic types and word-formation, both only less important than the cardinal principle of priority, made a reopening of the question inevitable, an event which is rapidly being brought about by the increasing frequency of papers upon nomenclature. The zoologists, while they have not gone so far in certain lines as the botanists, have greatly anticipated them by their action at the Zoological Congress of 1901, when they agreed to place zoological nomenclature upon a classical basis. Sooner or later, botanists must take the same action. When this time comes, biological nomenclature will be in a fair way to become a symmetrical, stable structure, based upon the two cardinal principles, priority and classicity. There can be little difference of opinion in regard to the repeated statement that nomenclature is merely an instrument in the hands of the biologist, and there should be just as little question that the instrument should be a worthy and ready one.

I.

Classical Greek and Latin are the basis of scientific nomenclature.

"Idiotae imposuere nomina absurda." Linnaeus Philosophia Botanica 158 1751.

There has never been any serious question concerning the necessity of a universal language for the natural sciences. The ancient and medieval development of biology, carried on first
by Greek and Roman philosophers, and then perforce by men who had at least some knowledge of Greek and Latin, determined irrevocably that this scientific language should be Latin, immeasurably enriched by Greek derivatives. So natural and complete, indeed, was this linguistic heritage from the ancients and the herbalists that Linnaeus merely simplified the syntax, definitised the vocabulary, and modified the use of Latin, with its incorporated Greek, to obtain a great binomial system, without which taxonomy as it is to-day would have been impossible. Since Linnaeus, no botanist has questioned the right of Greek and Latin to constitute the language of science. DeCandolle did indeed point out the many advantages English would possess as an international means of communication between scientists, but it was hardly his thought that English would supplant Latin as the language of taxonomy. The realization of the suggestion, in view of the fact that biological publication is made in sixteen languages, among them Russian, Magyar, and Japanese, is anything but imminent. Yet, while biologists are agreed that Greek and Latin shall furnish the materials for nomenclature and terminology, their practice, unfortunately, is still very far from uniform. Personal and vernacular terms from all possible sources have increased to such an extent that nearly a sixth of our present generic and specific names are derived from vernacular tongues. The economy of time and intellectual effort obtained by the use of such names is so considerable that they will always appeal to the poorly prepared or indifferent descriptive biologist. But they offend all the canons of uniformity and taste, and the real taxonomist, whose work is thorough and pains-taking from the first glimpse of a new organism to the final publication of its name and diagnosis, will avoid them.

The best Greek and the best Latin available are alone good enough for biological nomenclature. The Greek and Latin of Linnaeus were the work of no very certain hand, and should not constitute the standard, when a better standard is obtainable. Linne's knowledge of word-formation in Greek was often elusive, though his names are far superior as a rule to those of more recent coinage. Similarly, the formations of Byzantine
Greek and Late Latin, as well as those of many preclassic authors in both languages, have little value for the nomenclator. Classic Greek and Latin only can be fully satisfactory, since they are not merely the best Greek and Latin obtainable, but, also, because they present the best conditions for securing essential uniformity. Again, it should be clearly understood that classic Greek and Latin are not necessarily the Greek and Latin of the extreme purist.

II.

A name or term is invalid unless constructed according to the principles of word formation in classic Greek or Latin; alternatives are to be reduced to a uniform basis. Retroactively, all terms improperly constructed shall be corrected, except in the case of words of uncertain or unknown etymology, when no correction shall be made if any proper Greek or Latin construction will give such a word, with a possible meaning.

"Nomina generica ab uno vocabulo . . . fracto altera integra composita Botanicis indigna sunt." Critica Botanica 29 1737.

"Nomina generica ex duobus latinis vocabulis integris et conjunctis vix toleranda sunt." Ibid., 26.

This rule finds its warrant in the fact that uniformity is a first requisite of nomenclature as purity is of linguistics. A malformation is not only unpleasant as well as incorrect philosophically, but it is also extremely unfortunate by reason of the complications which it introduces into nomenclature. The philologist is satisfied only with most skilful handling of derivatives that is possible. He will no more be guilty of a malformation or a hybrid than the true scientist will be capable of a bit of superficial or bungling work. The latter must then learn to look upon linguistic matters with the same conscientiousness that he uses in scientific investigation. Ultimately, however, he must be prepared to go farther than the philologist even, for the sake of uniformity. The latter is chiefly concerned with the development of a language, or group of languages, and with him slightly different or alternative forms are of advantage rather than a source of difficulty. In science, where the form and ap-
plication of each name or term should be absolutely fixed, alternative forms of words and alternative methods of composition lead inevitably to grave confusion. The nomenclator must in consequence outdo the philologist in his own field. When it is possible to obtain essentially the same derivative in several slightly different forms by varying the stem of the first term, the connecting vowel, or the form of the last term, or by proceeding from alternative forms of the same word or stem, then the nomenclator must make the most intelligent choice possible in the selection of the best form to use, or the best principle to govern. In so doing, he will often strengthen the hands of the philologist, since it is a well-known fact that many alternative forms are merely the bungling creations of the decadent period of a language.

In choosing a principle for guidance in dealing with alternative forms and methods of derivation, several courses have been considered. The first plan was to follow the usage in the case of each particular word, but it soon became evident that no one but a specialist in philology would be able to make derivatives at all, since the usage varied repeatedly in words of the same group. A similar attempt was made with regard to the best usage, but, while this led to somewhat greater uniformity, the results were not much more satisfactory, and the labor involved was enormous. From the first it was seen that, while an occasional word would deviate more or less regularly from the formation typical for its group, as in the case of the imparisyllabic neuter, στόμα, στόματος (mouth), which regularly enters into composition in its shortened stem form, the philologically correct stem, or the correct connective, was overwhelmingly predominant. Furthermore, since such usage includes the best usage in all cases, it was concluded that uniformity and purity could best be obtained by making this the invariable usage for all the stems of any group, as well as for all combinations of each stem.

The justification of such a rule may be readily found in a consideration of imparisyllabic stems, which have constituted the most fertile source of alternatives. The Greek neuters in -μα, gen. -ματος, furnish a large number of examples in which the
shortened form of the nominative and the stem proper of the oblique cases alternate in word-formation. The Greek lexicon exhibits 1,782 neuters of this class, of which 231 appear in 969 derivatives as the first term. In the latter the proper stem appears in 781 words, while the shortened form appears in 188 words. The alternation of these stems in Greek has of necessity given rise to corresponding alternatives in nomenclature. Thus, there are found Grammonema Ag. 1832 and Grammontena Kuetz. 1845, Lomaspora DC. 1821 and Lomatospora Reichenb. 1828, Spermodermia Tode 1790 and Spermatodermia Wallr. 1833, Stomotechium Lehm. 1818 and Stomatotechium Spach 1843. Unfortunate and confusing as the variants of the same generic name are, the case is very much worse when the variations of one stem furnish two otherwise valid generic names, as in the case of Dermatocarpus Eschw. 1823 and Dermocarpa Crouan 1858, Grammocarpus Seringe 1825 and Grammatocarpus Presl 1831, Haemospermum Reinw. 1825 and Haematospermum (Wallich) Lindl. 1836. In the former, we are concerned merely with uniformity, desirable as that may be, while in the latter the validity of a generic name is destroyed because of its essential identity with an earlier name, an identity of which the later author was probably unaware. Such fatal duplication of generic names can only be avoided by stringent rules for securing uniformity in methods of derivation. Myosurus L. 1737 (Myosuros Dill. 1719) and Myurus Endl. 1837 are again alternative forms of the same compound word, which have been applied to different genera. The former illustrates the rare and archaic type of syntactic composition, the latter follows the usual method of composition by stems. In the case of Coleosanthis Cassini April 1817 and Coleanthus Seidl July 1817, the latter, though correctly formed, falls by the working of priority before the former, which is a blunder, equally indefensible from the standpoint of syntactic or non-syntactic composition. Callitriche L. 1751 and Calothrix Ag. 1824 illustrate the confusion that arises from using alternative Greek words (καλλι-, καλός, beautiful) and from the variation of the termination of the last member of the compound. Either first term is correct, but their compounds are
identical in meaning and essentially so in derivation. They are
to be regarded merely as different forms of the same compound,
and Calothrix becomes a homonym. The confusion wrought by
alternative forms and blundering construction is nowhere better
shown than in the following series of names, belonging to five
different genera: Asterothrix Cassini 1827 (Astotrix Brogn.
1843, Asterothria Gren. 1850), Asterotrichion Link 1840 (As-
terostrichion "Klotsch" 1840, Asterotrichium Witts.), Astro-
trichia Zanard. 1843 Astroticha DC. 1829 (Astrotichia Rchb.
1837), and Asterotrichum Bonord. 1851.

The retroactive application of this rule is imperative for the
sake of uniformity and purity. By far the greater number of
plant genera have already been recognized and named. The new
names to be proposed for years to come will be relatively few,
and a reform which affected even all of these would be barely
worth while. Further than this, most new names are made after
the pattern of names already in use, whether correctly or incor-
rectly formed, a practice certain to perpetuate the blunders of
the past. Arguments from the standpoint of purity are equally
cogent, but, as they would perhaps appeal to the philologist alone,
they will not be insisted upon here. A rule of this sort to be at
all worth while must be retroactive, for by retroaction alone can
confusion be avoided and uniformity secured. The retroactive
operation of the rule must be so safeguarded, however, that
changes for reasons of uniformity or purity will be made upon
real and not upon supposititious grounds. Framers of generic
names have been extremely careless in the matter of indicating
etymologies, but this is not sufficient warrant for reconstruc-
ing names upon the basis of supposed meanings. Many a genus
has received a name of known or evident etymology, but of
meaningless or mistaken application, a fact which should re-
strain us from correcting words of unknown derivation on the
basis of an assumed etymology. In making changes to secure
a more uniform and stable nomenclature, the greatest care must
be taken to minimize the error arising from personal judgment.
In many words of uncertain etymology, several derivations are
equally plausible, or at least possible, and the exercise of per-
sonal choice would simply lead to greater confusion. For these reasons, changes in words where the etymology is not expressly indicated or clearly evident should not be made, unless the proper formation of such a word in Greek or Latin fails to give a name of any possible meaning. The correction of such words as fall under this rule can only be made upon the basis of greatest probability, which, unsatisfactory as it may be, will conduce to the ends sought.

WORD FORMATION IN GREEK

Greek words arise by derivation or by composition. In derivation, roots or stems acquire a new meaning through the addition of a suffix, a termination having no separate existence in the language, except in the rare case of certain words which have lost their real significance and are now found only as suffixes. In composition, two, rarely more, words are united according to certain rules to form a new term, or compound, in which the meaning of each may be traced. Formation by prefixes is really a sort of composition, except in the case of a few inseparable particles, which properly belong under the head of derivation. For the sake of convenience, however, all formation by prefixes will be considered under composition.

Greek has obtained its stems by derivation, i.e., by adding suffixes to roots, a process to which the origin of all simple words may be traced. Derivation belongs chiefly to the earlier development of the language, and, indeed, is very largely prehistoric, especially in the case of primary derivation. Composition, on the other hand, is a much later development, and must have attained its maximum in the classical period of Greek literature. Both derivation and composition afford the biologist the means of coining new words. For various reasons, among them convenience and usage, scientific terms have been taken directly from the Greek lexicon (sometimes, of course, they have been found already borrowed in Latin), or new words have been formed by composition. Formation by derivation is equally valid, and the fact that it almost invariably gives shorter words leads one to wonder that it should not have come into general use. The reason may be found in the fact that word-formation
in biological nomenclature has been far from scholarly, and that derivation requires much greater care and knowledge than composition does. It is also true that the possibilities of derivation in Greek, though large, are necessarily limited by the relatively small number of suffixes, while the sources of composition are practically inexhaustible.

**DERIVATION**

Derivation consists in the addition of one or more suffixes to the primitive, irreducible portion of a word, which is termed a root. It may be distinguished as primary when one suffix is added to the root, making a stem, secondary when a second suffix is added to the stem, tertiary when a third suffix is attached, and so forth. For convenience, however, we may follow Henry,¹ and term those derivatives primary in which the root carries a single suffix, and secondary, all those in which the stem thus formed has been modified by one or more accretions. Furthermore, derivatives are classed as verbal when the suffix added permits of conjugation, and nominal when it permits of inflection. It is important that this be kept distinct from the fact that certain suffixes can be added only to verbal stems, while others can be attached only to nominal (denominative) ones. Nomenclature is not concerned with the construction of verbal stems, and the suffixes which follow are those which form nominal stems, i.e., nouns and adjectives.

Primary derivatives are formed by attaching the suffix immediately to the root, though rarely an adventicious -σ- intervenes. Secondary derivatives are made in similar manner by adding the suffix directly to the stem. In both cases, the groups of letters thus brought into contact conform to certain general phonetic principles of the language. For convenience in making the changes, which arise in this way in derivation and composition, a short summary of the phonetic mutations in Greek is given. Mutations peculiar to verbal stems are omitted. A more complete account of these phonetic laws may be found in any of the more comprehensive grammars.

Aspirates

In composition, aspirates (χ (kh), φ (ph), θ (th)) arise when a surd (κ, τ, ῥ), usually by elision of the final vowel of the stem of the first term, comes in contact with an initial aspirated vowel of the second term.

δέκ (a) - ἡμέρα = δεχήμερος, ten-day
ἐπ (ι) - ἐδρα = ἐφεδρος, seated upon
ἀντ (ι) - ἄρος = ἄνθορος, an opposite limit

Very rarely, this influence is exerted through an interposing consonant.

τέτρ (a) - ἵππος - τέθριππος, with four horses abreast

Accumulation of Consonants

As a rule, groups of consonants are modified to prevent harshness. Generally, three successive consonants, or a consonant and a double consonant, are avoided, or one letter is dropped, unless the first or last is a liquid (λ, μ, ν, ρ), or γ before a palatal (κ, γ, χ, ξ).

πέμπτος, fifth; ὀκληρός, hard; σάλπιγξ, trumpet

In composition, final κ or σ of the first term may stand before two other consonants.

ἐκστροφή, dislocation; ἐκφθείρω, to destroy utterly

The concurrence of two consonants, when it produces harshness, is avoided in several ways.

(1) When, by the transposition or loss of a letter, μ or ν stands immediately before λ or ρ, the corresponding sonant (β, δ) is inserted.

μέσ (ος) - ἡμέρα - μεσημ (ε) πα - μεσημβρία, midday
ἀνήρ, genitive, *αν (ε) ρος - ἀνρός, - ἀνδρός, man

(2) A consonant is sometimes transposed to a more convenient position.

πυκνός, genitive, πυξί, nominative, meeting place

Assimilation.

Two explosives can occur together only when the latter is a dental (τ, δ, θ). In such a group a palatal or labial must be of the same order, and another dental is changed to σ;
κ and π can alone stand before τ, γ and β before δ, and χ and φ before θ, while σ may occur before all three.

φλεκτικός, burning, from φλέγω, to burn; τριπτήρ, rubber, from τρίβω, to rub
πλέγδην, entwined, from πλέκω, to twist; γράβδην, grazing, from γράφω, to grave
σχιστός, cloven, from σχίζω, to cleave; πειστέων, persuaded, from πείθω, to persuade

έκ, from, always retains its final palatal in composition.

έκδημος, foreign; έκθνμι, pustule

Before σ, β and φ become π, γ and χ become κ, while τ, δ, and θ are dropped; κσ is then written ε and πσ is written ψ.

χάλυβος gen., χαλυβ-ς nom. -- χάλυψ, a Chalybean
γράφω, γραφ-σω -- γράφω
μάστιγος gen., μάστιγ-ς -- μάστιξ, whip
τρίχος gen., θριχ-ς -- θρίξ, hair
χάριτος gen., χαριτ-ς -- χάρις, grace
λαμπάδος gen., λαμπαδ-ς -- λαμπάς, torch

κόρυφος gen., κορυθ-ς -- κόρυς, helmet

This rule applies to such groups as -κτ-, in which the τ is first dropped and the κ then passes into ε.

νυκτός gen., νυκτ-ς = νύξ, night

Before μ, labials (π, β, φ) become μ, palatals (κ, χ) become γ, and dentals (τ, δ, θ, ζ) become σ.

βλεπ-μα (βλέπω) -- βλέμμα, glance; τριβ-μα (τρίβω) -- τρίμμα, anything rubbed; στεφ-μα (στέφω) -- στέμμα, garland; πλέκ-μα (πλέκω) -- πλέγμα, anything plaited; τευχ-μα (τεύχω) -- τεύμμα, a work; ἀδ-μα (ἀδω) -- ἄσμα, song; σχιδ-μα (σχίζω) -- σχίσμα, cleft; πειθ-μα (πείθω) -- πείσμα, cable.

έκ remains unchanged; έκραγμα, a wax impression

The dentals (τ, δ, θ, ζ) are retained only before λ, ν, ρ. Before μ, they become σ (see above), as also before each other; before σ they are dropped.

πειθ-τικός (πείθω) -- πειστικός, persuasive; ἡδ-θῆμα (ἡδομαί) -- ἡσθήμα, delight; σπερματ-σι, dat. (σπέρματα) -- σφέρμασι; σχίδο-σις (σχίζω) -- σχίσσις, cleaving.

Before another liquid (λ, μ, ρ), ν is assimilated to the liquid; be-
fore a labial (π, β, φ, ψ), it becomes μ; before a palatal (κ, γ, χ, ε), it changes to γ; before σ, it is elided and the preceding vowel usually lengthens; before another ν, it is usually retained.

παλιμμήκης (πάλν), very long; παλίλλιντος, loosed again; παλίρροια, back water; παλιμπλανής, wandering to and fro; σύμβλεμα (σύν), seam; σύμφωνις, a growing together; σύμψαλμα, harmony; παλέγκυρτος, fishing net; σύγγονος, congenital; σύγχροος, of like color; συγξεῦ, to smooth by scraping; μέλανος, μελάν-ε = μέλας; δαίμονος, δαίμον-σι = δαίμοσι; γίγαντος, γιγαντ-ς = γίγας.

Σύν drops its final before σ and a consonant, or before ζ, but the ν is simply assimilated before σ and a vowel.

σύστημα, system; σύζωμα, girdle
συσσωσμός, earthquake; σύσσωμος, united in one body

Πάλν assimilates its ν before σ and a vowel, and usually retains it before σ and a consonant; before another ν, it is either dropped or retained.

παλίσαντος, rushing back; παλίνσκοιος or παλίσκοιος, deeply shaded
παλίνζωος, living again; παλίννοστος or παλίννοστος, returning

Αγαν always drops ν, except where doubling or assimilation takes place.

ἀγάννυφος, ἀγάρροος

Εν does not change its final before ρ, σ, or ζ.

ἐνρέος, rooted; ἐνστάσις, plan; ἐνζέννυμι, to boil in

Doubling of Consonants

(1) In word-formation, initial ρ is generally doubled when it follows a vowel, but remains single after a diphthong.

διαρρωγή, gap; γλυκύρριξα, sweet root; εἰρυρέων, broad-flowing; εἰρείξσος, well-rooted

(2) An aspirate is never doubled, but the corresponding surd takes the place of the first. Σαφφώ for Σαφφώ, etc.

(3) Doubling is a frequent phenomenon (mostly in verbs and comparatives) when the suffix ya (ι) follows the final consonant of root or stem; final κ, γ, χ, and, rarely, other explosives, absorbing ι, becoming σο, δ becomes ζ, and λ becomes Λλ.
Metathesis, or transposition of this t takes place when it follows final ν or ρ.

θεράπανα = *θεραπ-αν-γα = θεραπανα
σώτειρα = σωτηρ-ια

Syncope or elision of a vowel often occurs in the middle of a word.

πατρός for πατέρος

Contraction of vowels should be ignored, when an occasion for it might arise in forming scientific terms.

**NOUN SUFFIXES**

**General**

-μο- (μος, m.) primary or secondary verbal oxytone: θυ-μός, heart; ἐφ-ω-μός, strife

-μα- (μῆ, f.), primary (or secondary?) verbal paroxytone: θέρ-μῆ, heat

-ο- (-ος, -ον, m. or n.) chiefly primary: νομ-ός, pasture; λῦκ-ος, wolf

-α- (α, f.) chiefly primary: φυγ-ῆ, flight; ρο-ῆ, stream; λευκ-η, white poplar

-ι (-ις, m. or f.) chiefly primary, paroxytone: πόλ-ις, city

-εν-, -ον- (ην, -ων, m. or f.) primary or secondary, mostly verbal:
  ἄρο-ην, male; έικ-ών, image, αἷ-ων, age

-μεν- (μῆν, m.) primary oxytone: ιμ-μήν, harbor

-μον- (μον, m.) primary paroxytone: τέρ-μων, boundary

-μον- (μον, n., μῆν, f.) primary, usually oxytone: στρω-μνή, bed

-ρο- (ρος, m., -ρα, f., -ρον, n.) primary, mostly oxytone: ἐδ-ρα, seat, δο-ρον, gift

-λο- (λός, m., -λῆ, f., -λον, n.) primary, mostly oxytone: φυ-λή, tribe; φῦ-λον, class.

-λος, -ηλη, -ωλον, -ωλη, are widely extended false suffixes used after a consonant: they show the accretion of certain stem vowels.

-νο- (-νος, m., -νη, f., -νον, n.) primary, often oxytone: ἔπ-νος, s'eepl; πον νῆ, penalty; τέκ-νον, child. An adventitious a has given the suffix -αιο- (-αιος, -αιη, -αιον, seen in: στέϕ-αιος, crown; μηχ-αιη, device; δρηπ-αιον, scythe.
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-\textit{vi} (-\textit{vis}, f.,) primary: \textit{μη-\textit{vis}}, wrath
-\textit{to} (-\textit{tos}, m., -\textit{τη}, f.) primary, usually paroxytone: \textit{χορ-\textit{tos}}, yard; \textit{κοι-\textit{τη}}, bed
-\textit{at} (-\textit{αρ}, -\textit{ωρ}, n.) primary: \textit{ηπ-\textit{αρ}}, liver; \textit{βδ-\textit{ωρ}}, water
-\textit{ak} (-\textit{αξ}, m.) primary paroxytone: \textit{ρυ-\textit{αξ}}, torrent; \textit{αρπ-\textit{αξ}}, robber
-\textit{ad} (-\textit{ας}, f.) primary or secondary, verbal or denominative, oxytone: \textit{λαμπ-\textit{ας}}, torch; \textit{εβδ-\textit{ωμ-\textit{ας}}}, week
-\textit{id}, -\textit{θ} (-\textit{ις}, f., rarely m.) primary or secondary, mostly oxytone when feminine, and paroxytone when masculine: \textit{δρυ-\textit{ις}}, bird; \textit{κλε-\textit{ις}}, key; \textit{πα-\textit{ις}}, child; \textit{ημερ-\textit{ις}}, oak with edible acorns; \textit{βασιλ-\textit{ις}}, queen
-\textit{ut} (-\textit{ις}, f., -\textit{ι}, n.) primary paroxytone: \textit{χαρ-\textit{ις}}, grace; \textit{μελ-\textit{ι}}, honey
-\textit{ot} (-\textit{ως}, m.) primary paroxytone; \textit{γελ-\textit{ως}}, laughter
-\textit{ow} (-\textit{ος}, -\textit{ως}, m. or f.) primary, feminine oxytone, masculine paroxytone: \textit{ηχ-\textit{ω}}, sound; \textit{ηπ-\textit{ως}}, warrior
-\textit{ep} (-\textit{ηρ}, m.) primary oxytone: \textit{α-\textit{ηρ}}, atmosphere; \textit{αιθ-\textit{ηρ}}, ether
-\textit{op} (-\textit{αρ}, -\textit{ωρ}, n.) primary paroxytone: \textit{α-\textit{ωρ}}, sword; \textit{πελ-\textit{ωρ}}, prodigy

\textit{Agent}

-\textit{ηυ} (-\textit{ευς}, m.) primary, verbal or denominative, oxytone: \textit{γραφ-\textit{ευς}}, writer
-\textit{ευ} (-\textit{ευς}, m.) secondary denominative oxytone: \textit{γραμματ-\textit{ευς}}, scribe
-\textit{τερ} (-\textit{τηρ}, m., -\textit{τερα}, f.) primary or secondary verbal oxytone: \textit{λυ-\textit{τηρ}}, deliverer; \textit{νικ-\textit{η-τηρ}}, conqueror
-\textit{τορ} (-\textit{τωρ}, m.,) primary or secondary verbal paroxytone: \textit{ρη-\textit{τωρ}}, orator; \textit{νικ-α-τωρ}, conqueror
-\textit{τα} (-\textit{της}, m.) primary oxytone or paroxytone: \textit{κρι-\textit{της}}, judge

Secondary (1) verbal, usually oxytone, with short primary vowel or sigma, \textit{ναι-ε-\textit{της}}, inhabitant, \textit{ερα-ο-της}, lover, or with long primary vowel, \textit{νικ-η-της}, conqueror, or with long primary vowel and sigma, \textit{δρυ-η-σ-της}, dancer; (2) denominative, generally paroxytone, \textit{οικ-ε-\textit{της}}, servant, \textit{δεσ-μω-\textit{της}}, prisoner. From these words, the stem vowel has come to remain attached to the suffix, giving the agent suffixes, -\textit{ης}, -\textit{ειτης}, -\textit{ωτης}, ιωτης.
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Means or Instrument

-τρο- (-τρος, m., -τρα, f., -τρον, n.) primary or secondary verbal, feminine and neuter usually paroxytone: δευ-τρός, knife; ἰη-τρα, agreement; βάκ-τρον, staff; ἰπ-ο-τρον, plough

-τλο- (-τλος, m., -τλον, n.) primary, usually paroxytone: ἄν-τλος, bucket; χυ-τλον, liquid

(-τλη, f.) secondary verbal, usually paroxytone: ἐχέ-τλη, handle

-θρο- (-θρον, n.) primary, usually paroxytone: ἀρ-θρον, joint

(-θρα, f.) secondary verbal, usually paroxytone: κοι- μη-θρα, chamber

-θλο- (-θλη, f., -θλον, n.) primary (or secondary?) paroxytone: θός-θλον, sacred implement; γεν-θλη, race

-κο- (-κη, f.) primary paroxytone: θη-κη, box

-ευ- (εύς, m.) secondary verbal or denominative oxytone: ἀμέλγ- εύς, milkpail

Result

-ματ- (-μα, n.) primary or secondary, verbal (secondary rarely denominative) accent recessive: φράγ-μα, palisade; ὀδ-μα, body; δη-λη-μα, bane

-εσ- (-ος, n.) primary, mostly paroxytone: βέλ-ος, dart; ἐλ-ος, marsh

Place

-τὴρο- (-τηρον, n.) primary or secondary verbal proparoxytone: δυκας-τηρον, court house

-εω- (-εων, n.) primary or secondary denominative paroxytone: ψιλ-εων, prairie

-ον- (-ον, m.) primary or secondary denominative oxytone: ἀμπελ-ον, vineyard

-τρα- (-τρα, f.) primary or secondary verbal paroxytone: παλαί-σ-τρα, place for wrestling

Action

-τι- (-τις, f.) primary verbal, usually paroxytone: φά-τις, speech

-σι- (-σις, f.) primary or secondary verbal, usually paroxytone: φύ-σις, nature; ἀφάν-ε-σις, disappearance

-σω- (-σω, f.) usually secondary verbal paroxytone: δοκυμ-σία, testing
Quality
-ω- (-ω, f.) primary or secondary denominative, mostly paroxytone: ἀρμον-ω, harmony
-ος-, -ες- (-ως, m. or f.) primary oxytone: ἵ-ως, dawn
(-ος, n.) primary recessive: βάρ-ος, weight, ἔρευθ-ος, redness
-τητ- (-της, f.) secondary denominative paroxytone: λεπτό-της, thinness; whence -οτητ- (-ότης, f.) παντό-ότης, universality
-ονν- (-οννη, f.) secondary denominative paroxytone: σωφρο-σύνη, prudence

State or Object
-δον- (-δων, f.) secondary verbal oxytone: ἀλγ-η-δόν, suffering
-μονο- (-μονη, f.) primary verbal oxytone: χαρ-μονή, joy
-τυ- (-τυς, f., -τυ, n.) primary: βρω-τύς, meat; ἀσ-τυ, town
-υθ, -υθ- (-υς, f.) primary, often oxytone: χλαμ-ύς, cloak

Diminutives
-ιο- (-ιων, n.) primary or secondary denominative paroxytone: στορπ-ιων, little spore. Various suffixes of stems have become attached to this diminutive, giving the common diminutive suffixes, -αριον, -ιδιον, -υδριον, -υλλιον, -υφιον, all forming neuter proparoxytones.
-ικο- (-ικος, m., -ικη, f.) primary or secondary denominative paroxytone: νεαν-ικος, youth; παιδ-ικη, little girl. This suffix sometimes combines with -ιον to form a suffix -ικιον, neuter proparoxytone; ἄσπιδ-ικιον, small shield.

Patronymics
-δα- (-δῆς, m.) secondary denominative paroxytone
-δ- (-δς (δες) f.) secondary denominative oxytone
Stems of the first declension add the suffix directly: Βορεά-δῆς, son of Boreas; Βορεά-ς, daughter of Boreas.
Stems of the second declension replace ο of the stem with ι: Πριαμ-ιδῆς, son of Priam; Πριαμ-ις, daughter of Priam. Those in -ω, however, change ο to α, giving the suffixes -ιάδης and -ιάς.
Stems of the third declension insert ι before the suffix, εω dropping the ν before ι: Κεκροπ-ιδης, a son of Cecrops; Κεκροπ-ις, daughter of Cecrops.
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ADJECTIVE SUFFIXES

General
-es- (-ης, m., f., -ες, n.) primary, rarely secondary denominative oxytomes: ψευδ-ής, false; ευγεν-ής, well-born; λυτ-αρ-ής, persistent
-o-, -a- (-ος, m., -η, -α, -ος, f., -ον, n.) primary or secondary (denominative when secondary) always oxytone, except in compounds: ψιλ-ός, η, όν, bare; ηπ-ός, α, όν, dry; βου-νομος, όν, grazed by cattle
-ad- (-ας, m., f.) primary oxytone: σπορ-άς, scattered; λογ-άς, selected
-ωδ- (-ως, m., f.) secondary denominative oxytone, feminines of nouns or adjectives, most having become substantives: Δελφ-ίς, Delphian

Ownership or Relation
-ω- (-ος, -α, -ων) primary denominative proparoxytone: στυγ-ως, hateful; secondary denominative; (1) the stem vowel may be elided before ω, as θαλάσσ-ως, marine, from θαλάσσα, or (2) it may be retained, as δίκα-ως, just, δμω-ως, similar, whence arise new forms of the same suffix, i.e., -αιως, -αιως, -αιος, ως, etc.
-σω- (-σως) arose from adding -ω- to stems in -τι, but is now regularly used as a suffix; θαμά-σως, wonderful.
-ιδω- (-ιδως) arose from attaching -ιω- to stems in -δ-, but has become a regular suffix (especially frequent in the neuter to form diminutives): θαλασσ-ιδως, marine.
-κο- (-κος, η, ον) secondary denominative oxytone: φυσι-κός, natural: whence has probably come -ικο- (-ικος), πολεμ-ικός, warlike, δερ-ματ-ικός, cutaneous; whence -τικο- (-τικός), especially applied to nouns of agent in -της. The addition of -κός to stems in -α has given the suffixes -ιακός, and -ακός; to stems in -ν, -νκός.

Material
-νο- (-νο-), (-νος, η, ον) primary or secondary denominative proparoxytone: δρύ-νος, oaken; ξύ-λ-νος, wooden

The modification of the initial vowel of the suffix has pro-
duced the suffix -ηνο- (-ηνος), which is a secondary verbal oxytone, πετ-ε-ηνος, winged.

-ιο- (-ιος, -εα, -εον) secondary denominative proparoxytone: the nominative form arose from primary stems in -ε, and the intervocalic ι was then elided, ἄργυρω-ιο-ς = ἄργυρος, silver; μολυβδ-εος, leaden.

-ινεο- (-ινεος) secondary denominative paroxytone: formed by adding -ιο to -ινο; φιγ-ινεος, oaken.

Quality

-μο- (-μος) primary oxytone: θερ-μος, hot. The addition of this suffix to stems in -τι, δρα-στι-μος, active, has produced a secondary denominative suffix -μος, ἓδ-ώδ-μος, eatable, and this, by further combination, has given -ἀλμος, ἓδ ἄλμος, beautiful.

-ρο- (-ρος) primary, nearly always oxytone: λαμπ-ρος, bright; ἐρυθ-ρος, red: secondary, mostly denominative, usually oxytone: φαν-ε-ρος, plain, whence the suffix -ηρος; κυματ-ηρος, billowy.

-λο- (-λος) primary, nearly always oxytone: δει-λος, timid. Secondary denominative oxytone: στιγ-η-λος, silent, whence the suffixes -ηλος, -ωλος, etc.; ἀπατ-ηλος, deceitful; ἀμαρτ-ωλος, used to sin.

Fulness

-εντ- (-εις, -εσσα, -εν) secondary denominative, usually paroxytone, the feminine proparoxytone: χαρί-εις, graceful; πτερό-εις, winged, whence the suffixes, ->this, ->es; σκι->εις, shady, δενδρ->εις, woody.

-νο- (-νος) primary oxytone: σεμ-νος, holy
-ινο- (-ινος) primary and secondary oxytone: πεδ-ινος, quite level; ὀρ-ε-ινος, mountainous, whence -ινος; εὔδ-ινος, quite cheerful.

-ρο- (-ρος) primary paroxytone, ἵδ-ρος, skilful
-αλεο- (-αλεος) secondary paroxytone: θρ-αλεος, strong; ψωρ-αλεος. itchy
-μον- (-μον, -μον) primary, usually paroxytone: ἵδ-μον, skilful

Ability or Fitness

-ικο- (-ικος) secondary verbal oxytone: γραφ-ικος, able to write; ἄρχ-ικος, fit to rule
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-τικό- (τικός) secondary verbal oxytone: πρακ-τικός, practical

-μο- (μος) primary or secondary, mostly verbal, proparoxytone: πότ-μος, drinkable; βανά-σ-μος, deadly, hence -σμος?

-μαιο- (μαιος), υποβολ-μαιος, spurious

Time
-ινό- (-ινός) usually secondary, denominative oxytone: ημερ-ινός, of day; δπωρ -ινός of late summer; χθει-ινός, of yesterday

Likeness
-ώδε- (-ώδης, m., f., ύδες, n.) secondary denominative paroxytone, arising from είδος, τό, form, in composition as the last term, whence the form -εωδής, and, by contraction, -ώδης; λμν -ώδης, like a marsh, marshy. This suffix is often used to indicate fulness, also.

Verbal: Capability or Obligation
-το- (-τος) primary or secondary verbal oxytone: σχισ-τός, split; κλει-τός, renowned; φιλ-η-τός, loved

-τεο- (-τεος) secondarily verbal paroxytone: φιλ-η-τεος, lovable

COMPOSITION

Greek exhibits two types of composition, syntactic and non-syntactic. Syntactic composition is the union under a single accent of two words, one being merely a modifier of the other and in the case demanded by this relation. Such forms arise often from juxtaposition, for reasons of convenience, and are not, properly speaking, compounds, e. g., κυνός-βατος, dog thorn (κύων, κυνός, dog), μυος-ωτίς, mouse ear (μυό, μυός, mouse). The subordinate word is usually in the genitive, though, rarely, it may occur in practically any case. In non-syntactic composition, the two terms of the compound are morphologically coordinate, though the one is usually subordinated to the other in meaning. The second word is attached to the stem of the first in the same way that secondary suffixes are added to stems, with the very important exception that the final vowel of the first member has become a universal thematic vowel, or connective, e. g., μακρο-στόρα, κορυνη-φορα. Non-syntactic composition is the only real composition. It is so overwhelmingly predominant in Greek that it
alone needs to be taken into account. Indeed, syntactic composition must be sedulously avoided by biologists, if confusion is to be prevented, and the few syntactic compounds already in existence in nomenclature should be made to conform to the rules for non-syntactic composition.

Compound words consist of three elements, the first term, the connecting vowel, and the last term. For reasons of convenience, the last term will be considered first, then the connective, and, finally, under the first term, will be given a detailed exposition of composition in the different classes of words.

**THE LAST TERM**

The last term is always a nominal stem, i.e., noun, adjective, or verbal adjective. The form of the last term is necessarily determined by its character, as follows:

I. If the last term is a noun, it may (1) stand without change, and the resulting compound is properly a substantive, though Greek often employs such words as adjectives, or (2) it may take adjectival endings, according to its declension, and the resulting compound is an adjective. Again, in Greek, practically all compound adjectives may be used as substantives.

II. If the last term is an adjective or verbal adjective, it may stand without change in the resulting compound, but usually it becomes an adjective of two terminations (-os, m., f., -ov, n., rarely, -ης, m., f., -ες, n.). The adjective may take substantive suffixes, in which case the compound will, of course, be a noun.

The following examples will illustrate the form of the last term and the character of the resulting compound.

I.1. The last term is a noun, undergoing no change.

\[\text{πόδο-σπόρα, } \dot{h} \text{ (πόδος, } \text{πόδος, } \delta, \text{ foot, σπόρα, } \dot{h}, \text{ seed) foot-spore}\]

\[\text{αιματο-κόκκος, } \delta \text{ (αιμα, αίματος, } \tau', \text{ blood, κόκκος, } \delta, \text{ berry) blood-berry}\]

\[\text{δφιο-σταφυλη, } \dot{h} \text{ (δφις, } \text{δφιος, } \text{δφιος, } \delta, \text{ snake, σταφυλη, } \dot{h}, \text{ bunch of grapes) briony}\]

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1 For accent of compounds, see Buttmann, 292.
I.2. The last term is a noun, changed to an adjective, usually by a suffix. The various changes of the noun depend upon its declension to a large extent.¹

a. If the final term is a noun of the first or second declension (stem in -ə or -o, nominative, -ης, -as, -os, masculine, -η, -a, -os, fem., -ov, neut.) the compound adjective will terminate in -os, masc. and fem., -ov, neut.

ευ-τοξιστ-ος, -ον (εύ, good, τοξιστής, ὁ, archer) with good archers
καλλι-νεαν-ος (κάλλι-, beautiful, νεανιάς, ὁ, youth) beautifully youthful
πολυ-λογ-ος (πολύς, much, λόγος, ὁ, word) talkative
λευκο-κομ-ος (λευκός, white, κόμη, ἡ, hair) white-haired
εύρυ-χωρ-ος (εύρυς, broad, χώρα, ἡ, space) roomy
τραχυ-οδ-ος (τραχύς, rough, ὁδός, ἡ, road) with rough roads

βαθυ-φυλλ-ος (βαθύς, thick, φύλλον, τό, leaf) thick-leaved, leafy

b. If the final term is a noun of the third declension with the stem in any consonant except ν, ρ, δ, or -ες, the compound adjective ends in -os, -ov.

μέλανο-φλεβ-ος (μέλανας, μέλανος, black, φλεψ, φλεβός, ἡ, vein) black-veined
μικρο-μαστιγ-ος (μικρός, short, μάστιξ, μάστιγος, ἡ, whip) short-ciliate
πολυ-ορνιθ-ος (πολύς, many, ὄρνις, ὄρνιθος, ὁ, ἡ, bird) abounding in birds
πυκνο-σαρκ-ος (πυκνός, thick, σάρκε, σαρκός, ἡ, flesh) with firm flesh
ἀ-σωματ-ος (ἀ-, without, σώμα, σώματος, τό, body) incorporeal
χρυσο-στομ-ος (χρυσός, golden, στόμα, στόματος, τό, mouth) golden-mouthed

¹ This account has been largely based upon Miller, Scientific Names of Latin and Greek Derivation, 134.
c. If the final term is a noun of the third declension with the stem in \(v, \rho, \text{ or } \delta\) (nom. \(\sigma\)), the compound retains this form, i.e., it is properly a noun used adjectively. Sometimes the noun is inflected in two genders, e.g., -\(\omega\), -\(\omicron\), or -\(\omega\rho\), -\(\omicron\), or, more rarely, it takes the adjective termination, -\(\omicron\), -\(\omicron\).

\(\mu\alpha\kappa\rho\omicron-\chi\epsilon\rho\) (\(\mu\alpha\kappa\rho\omicron\), long, \(\chi\epsilon\rho\), \(\chi\epsilon\rho\omicron\), \(\omicron\), hand) long-armed

\(\alpha\upsilon\tau\omicron-\chi\rho\omega\nu\) (\(\alpha\upsilon\tau\omicron\), self, \(\chi\rho\omega\nu\), \(\chi\rho\omega\nu\omicron\), \(\omicron\), ground) native

\(\sigma\kappa\lambda\rho\omicron-\pi\omicron\upsilon\upsilon\) (\(\sigma\kappa\lambda\rho\omicron\), hard, \(\pi\omicron\upsilon\upsilon\), \(\pi\omicron\upsilon\upsilon\omicron\), m., foot) hard-footed

kak\(\alpha\)-\(\pi\omicron\upsilon\upsilon\), -\(\pi\omicron\upsilon\upsilon\) (kak\(\alpha\), bad, \(\pi\omicron\upsilon\upsilon\), \(\pi\omicron\upsilon\upsilon\omicron\), m., foot) with bad feet

d. If the final term is a noun of the third declension with the stem in -\(\epsilon\)s (gen. -\(\epsilon\os\), nom. -\(\eta\), m. f. -\(\epsilon\os\), n.), the compound adjective will terminate in -\(\eta\), masc. and fem., -\(\epsilon\), neut.

\(\theta\epsilon\omega-\gamma\eta\eta\)s, es (\(\theta\epsilon\omega\), \(\delta\), God, \(\gamma\epsilon\nu\os\), \(\gamma\epsilon\nu\os\), \(\tau\), race) born of God

\(\tau\epsilon\chi\omicron-\mu\epsilon\lambda\eta\)s (\(\tau\epsilon\chi\omicron\), \(\tau\epsilon\chi\omicron\), \(\tau\), wall, \(\mu\ell\os\), \(\mu\ell\os\), \(\tau\), music) walling by music

\(\pi\omicron\nu-\alpha\nu\theta\)s (\(\pi\omicron\nu\), much, \(\alpha\nu\theta\os\), \(\alpha\nu\theta\os\), \(\tau\), flower) blossoming

e. If the final term is a neuter noun of the third declension with the stem in -\(\alpha\), nom. -\(\alpha\), the compound adjective as a rule ends in -\(\omega\)s (contraction of -\(\alpha\os\) for -\(\alpha\os\)) masc. and fem., -\(\omega\), neut., or, rarely, in -\(\os\), -\(\omicron\).

\(\mu\epsilon\gamma\alpha\lo-\kappa\epsilon\rho-\omega\)s, \(\omega\) (\(\mu\epsilon\gamma\alpha\lo\), \(\mu\epsilon\gamma\alpha\lo\), \(\tau\), \(\kappa\epsilon\rho\as\), \(\kappa\epsilon\rho\as\), \(\tau\), horn) large-horned

\(\pi\omicron\nu-\tau\epsilon\rho-\omega\)s (\(\pi\omicron\nu\), much, \(\tau\)\(\epsilon\rho\as\), \(\tau\)\(\epsilon\rho\as\), \(\tau\), wonder) full of wonder

\(\mu\omicron\nu-\kappa\epsilon\rho\at\os\) (\(\mu\omicron\nu\), single, \(\kappa\epsilon\rho\as\), \(\tau\), horn) with one horn

\(\delta\rho\theta\-\kappa\epsilon\rho\os\), \(\omicron\) (\(\delta\rho\theta\os\), upright, \(\kappa\epsilon\rho\as\), \(\tau\), horn) with upright horns

\(\gamma\lambda\nu\upsilon-\kappa\epsilon\rho-\os\) (\(\gamma\lambda\nu\upsilon\), sweet, \(\kappa\rho\as\), \(\kappa\rho\as\os\) (\(\kappa\rho\at\os\), \(\tau\), meat) sweet-meated

f. If the final term is a noun of the third declension with the stem in the vowel \(i\), or \(v\) (-\(\epsilon\), -\(\upsilon\), norm. m., f., -\(i\), -\(v\), neut.), it retains this form; rarely it terminates in -\(\epsilon\), -\(\omicron\).

\(\pi\omicron\nu-\chi\theta\omicron\upsilon\)s (\(\pi\omicron\nu\), many, \(\chi\theta\omicron\upsilon\), \(\chi\theta\omicron\upsilon\os\), \(\delta\), fish) abounding in fish; also \(\pi\omicron\nu-\chi\theta\omicron-\omicron\)s, \(\omicron\)
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πυκνο-δρυς (πυκνός, thick, δρύς, δρυός, ἦ, oak) beset with oaks
μελαν-δρυ-ος, ον (μέλας, μέλανος, black, δρύς, oak) dark with oak leaves
χρυσ-ωψ (χρύσεως, golden, ὑψος, ὑψος, ἦ, appearance) looking like gold
φυγο-πόλις (φύγος, fleeing, πόλις, πόλις, ἦ, city) fleeing from a city

II.1. If the last term is an adjective, the compound usually becomes an adjective of two terminations, -ος, -ον; rarely, there is no change. In case it is used substantively, it may appear in any gender at the coiner’s pleasure. The compound may, moreover, pass into a noun by the addition of a substantive suffix.

στενο-μακρός, ον (στενός, narrow, μακρός, long) long and narrow
μελανο-φαιός, ον (μέλας, μέλανος, black, φαιός, dusky) dark gray
λευκο-ερυθρός, ον (λευκός, white, ἐρυθρός, red) whitish red
ἐτερο-γλαυκός, ον (ἐτερός, different, γλαυκός, gray) with one eye gray
λευκο-μέλας, αινά, αν (λευκός, white, μέλας, black) whitish black
δέι-γλυκός, εια, α (δέις, sour, γλυκός, sweet) sourish sweet
ἐτερο-φων-ώς (ἐτερό-φωνος, of different voice) difference of tone
ζηλημο-στυν (ζηλήμων, jealous) jealousy

II.2. If the last term is a verbal adjective (in -ος, -τος, or -τεος), it may retain the active ending, -ος, -ον, or the passive ending, -τος, or -ής, -ες, may be substituted for either.

δια-στροφ-ος, ον (διαστρέφω, to twist about) twisted
περι-τροπ-ος (περιτρόπω, to turn round) turned round
περι-φερ-ης, ες (περιφέρω, to carry round) revolving
δυσ-μαθ-ης (δυσμαθέω, to be slow in learning) hard to learn
δυσ-τακ-τος, ον (τάσσω, to arrange) disordered, irregular
ἄ-λεπιδ-ω-τος (ἄλεπιδόμη, to be scaly) not covered with scales

The connective in Greek compounds was originally the final vowel of the stem, or, in imparisyllabics, the vowel of the genitive. The connective -ο was originally, then, characteristic of
nouns of the second declension, and of many stems of the third. By analogy, it spread to stems of the first declension, and the remaining stems of the third, and, finally, even to verbal stems. The overwhelming predominance of the connective -o- makes it advisable to disregard the use of the thematic vowel of each declension as a connective in making new compounds, and may be considered sufficient warrant for its insertion in compounds already constructed upon the basis of another thematic connective. Such duplicates as Corynephorus and Corynophorus should be avoided for the sake of uniformity in spelling, if for no other reason, but when they are the names of different genera, as in the present case, they are altogether unfortunate. Moreover, alternative connectives of this sort will always furnish occasion for similar blunders on the part of those not thoroughly conversant with the principles of Greek word-formation. The connectives which may be properly used with the different classes of first terms of compound words are shown in the following list of examples. The diversity of classical usage in this matter is a cogent argument for the use of -o- as a connective in all cases where the first term is a nominal stem, if not, indeed, everywhere that a connective is required.

1. First declension: stem in -a, nom.; -a, -η, fem.; -as, -ης, masc. 
   θαλάσσα(α)-o-φυλλον (θάλασσα, η, sea, φύλλον, τό, leaf) Thalassophyllum
   κεφαλ(η)-o-στύγμα (κεφαλή, η, head, στύγμα, τό, mark) Cephalostigma
   σκια-φιλη (σκιά, η, shadow, φίλος, loved) Sciphile
   θηλη-φορα (θηλή, η, nipple, φορά, η, carrying) Thelephora
   κλεπτ(η)-o-φυτον (κλέπτης, ο, thief, φυτόν, τό, plant) Cleptophyllum

   δοσκο-λεπίς (δόσκος, ο, leathern bag, λεπίς, η, scale) Ascolepis
   παβό-κρινον (πάβδος, η, rod, κρίνον, τό, lily) Rhabdocrinum
   βαλαν(ο)-η-φορός (βάλανος, η, acorn, φορός, carrying) Balanophorus
   ροδό-δένδρον (ρόδον, τό, rose, δένδρον, τό, tree) Rhododendrum
3. Third declension:

(a) Stem extending in an explosive, i.e., any consonant except $\sigma$, $\mu$, $\nu$, $\lambda$, $\rho$, or -ματ.

rhádiko-φυλλον (rhádix, rhádikos, ἤ, branch, φύλλον, τό, leaf) Rhad-icophyllum

κηλιδ(ο)-ανθος (κηλίς, κηλίδος, ἤ, spot, ἀνθος, τό, flower) Celi-danthus.

κερατο-στόμα (κέρας, κέρατος, τό, horn, στόμα, τό, mouth) Cerato-stoma

άσπιδ(ο)-φορος (άσπις, άσπιδος, ἤ, round shield, φορός, bearing) shield bearing

κέρας-φορος (κέρας, τό, horn, φορός, bearing) bearing horns

μελι-κόκκος (μέλι, μελίτος, τό, honey, κόκκος, ὀ, berry) Melicoccus

αι-πολος (αἰξ, αἰγός, ὀ, ἤ, goat, -πολος (-κολέω, dwell) goat-herd

(b) Stem ending in a nasal or a liquid ($ν$, $λ$, $ρ$).

άκτυνο-στροβος (άκτις, άκτινος, ἤ, ray, στρόβος, ὀ, whirling) Ac-tinostrobus

δαιμον-ρωψ (δαίμων, δαιμόνος, ὀ, divinity, ρώψ, ἤ, bush) Dae-monorops

θυν(ο)-ανθή (θύς, θυνός, ὀ, ἤ, heap, dune, ἀνθή, ἤ, bloom) Thin-anthe

άκμο-θετὸν (άκμων, άκμονος, ὀ, anvil, θετός, placed) anvil-block

άλο-σταχυς (άλης, άλες, ἤ, sea, στάχυς, ὀ, spike) Halostachys

άλι-θριάδες (άλης, ἤ, sea, θρίαδες, ἤ, lettuce) Halithridax

θηρο-φονον (θήρ, θηρός, ὀ, beast, φονός, slaying) Therophonum

γαστρο-χειλος (γαστήρ, γαστρός (-ἔρος), ἤ, belly, χείλος, τό, lip) Gastrochilus

γαστερ(ο)-ανθος (γαστήρ, ἤ, belly, ἀνθος, τό, flower) Gasteranthus

πυρ-φορον (πῦρ, πυρός, τό, fire, φορός, bearing) Pyrphorum

πυρ-φλογος (πῦρ, τό, fire, φλογός, blazing) flaming with fire

(c) Stem ending in -ματ-, nom., -μα, neuters

γραμματο-θηκη (γράμμα, γράμματος, τό, line, θήκη, ἤ, box) Gram-matathece

δέρματο-βλαστος (δέρμα, δέρματος, τό, skin, βλαστός ὀ, sprout) Dermatoblastus

φυματο-στρωμα (φύμα, φύματος, τό, tumor, στρῶμα, τό, bed) Phymatoastroma

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στομ(ο)-αρρήνα (στόμα, στόματος, τό, mouth, ἄρρην, ἄρρεν, male)
Stomarrhena
στομα-λύμη (στόμα, τό, mouth, λύμη, ἕ, lake) salt water lake
(d) Stem ending in -es; nom., -os, -ης, gen., -eos, mostly neuters. 
βελο-στεμμα (βέλος, βέλεος, τό, dart, στέμμα, τό, wreath) Belostemma
έλο-φυτον (έλος, έλεος, τό, marsh, φυτόν, τό, plant) Helophyton
όρο-φακή (όρος, ορεος, τό, mountain, φακή, ἕ, lentil) Orophace
όρο-δοξα (όρος, τό, mountain, δόξα, ἕ, glory) Oreodoxa
όρεο-βιος (όρος, τό, mountain, βιός, living) living in the mountains
όρεοι-προφος (όρος, τό, mountain, προφός, nurtured) mountain-nurtured
όρεο-σκιος (όρος, τό, mountain, σκιός, shadowed) over-shadowed by mountains
έιφ-η-φορος (έιφος, έιφεος, τό, sword, φορός, bearing) armed with the sword
βελη-η-φορος (βέλος, βέλεος, τό, arrow, φορός, bearing) bearing arrows
(e) Stem ending in -i or -v; nom., -is, -vs, masc., fem., -i, -v, neut.
πολιο-δειδρον (πόλις, πόλιος, πόλεως, ἕ, city, δειδρον, τό, tree)
Poliodendrum
πολιο-νομος (πόλις, ἕ, city, νομός, dealing out) civic magistrate
πολι-πορθος (πόλις, ἕ, city, πορθός, destroying) destroyer of cities
τιγρο-ειδης (τίγρος, τίγριος, ἕ, tiger, εΐδος, τό, form) spotted
ὀφιο-σκοροδον (ὀφίς, ὀφιος, ὀφεως, ὢ, snake, σκόροδον, τό, garlic,
Ophioscorodum
διο-πολος (δῖς, δῖος, ὢ, sheep, -πολός (-κολέω, dwell) shepherd
ίχθυο-μεθη (ίχθυς, ιχθύος, ὢ, fish, μέθη, ἕ, strong drink) Ichthyomethe
νεκυο-στολος (νέκυς, νέκυος, ὢ, dead body, στολός, ferrying) ferrying the dead
νεκυ-η-πολος (νέκυς, ὢ, dead body, -πολός, dwelling among) having to do with the dead
βοτρυ-φορος (βότρυς, βότρυνος, ὢ, cluster of grapes, φορός, bearing) bearing grapes
βου-πλευρον (βούς, βούς, ὢ, ὢ, ox, πλευρόν, τό, rib) Bupleurum
4. Verbal stems. When the first term is a verbal stem, it enters into composition with a thematic -ε (the form of the second person singular present imperative of -ω verbs), or with a sigmatic stem, -σι, resembling the sigmatic stem of aorists. The influence of analogy has been felt here also, in that both connectives occasionally yield to the -ο of noun stems, and, more rarely, ε and ι of the verbal stems interchange or assimilate.

\[
\text{φερε-βότρυς (φέρω, bear, βότρυς, βότρυνος, δ, bunch of grapes)}
\]

bearing bunches of grapes

\[
\text{λυσι-θρίξ (λύω, loose, θρίξ, τριχός, ή, hair) with loose hair}
\]

\[
\text{φερεσι-βίος (φέρω, bear, βίος, δ, life) bearing life}
\]

\[
\text{περσε-φονή (φέρω, bear, φονή, ή, death) Persephone, bringer of death}
\]

\[
\text{περσε-πολις (πέρθω, destroy, πόλις, ή, city) sacker of cities}
\]

\[
\text{ἀρχι-θαλασσος (ἀρχω, rule, θαλάσσα, ή, sea) ruling the sea}
\]

\[
\text{λιπτο-σκιος (λιπτω, leave, σκιά, ή, shade) shadowless}
\]

\[
\text{δυσ-κίνδυνος (δύπτω, throw, κίνδυνος, δ, risk) venturesome}
\]

**THE FIRST TERM**

The first term of a compound may be a nominal stem (noun, pronoun, or adjective), an indeclinable particle (adverb, preposition, or inseparable particle), or a verbal stem. The form of the first term will be that of its stem if this ends in -ο; if the stem ends in -α, -ο- will be substituted as the connective, and if it ends in -ί, -υ, or a consonant, -ο- will be added as a connective. The connective is omitted in the case of an indeclinable particle, and it is regularly elided before an initial vowel of the last term. In the following examples intended to show the form in which first terms of various categories should enter into composition, the effect of analogy is extended over all first terms of compound words which take a connective, with the exception of adjectives in -υς, -εια, -ι, and verbal stems. Its use might well be extended to verbals upon the analogy of λειπω, which regularly enters into composition in the form, λιπο-, but verbal first terms are rare in scientific compounds, and are rather to be discouraged on account of the alternatives to which they are certain to give rise.
From the standpoint of the biologist, the application of the connective -o- might well have been made universal, but in the case of adjectives in -us, the use of the thematic -v as connective is so invariable that the addition of an -o, as it is found in noun stems of the same sort, was felt to be unwarranted.7

I. Nouns.

1. First declension; nominative singular feminine, -a, -η; masculine, -ας, -ης. The stems of this declension are all originally in -a, which is often modified into -η. In feminines, the stem is identical with the nominative singular; in masculines, the stem is obtained by dropping the termination, -σ, of the nominative.1

> ρτρ(α)·φιλη (πέτρα, η, rock, φίλος, loved, loving) Petrophile
> ήμερ(α)·ανθος (ήμερα, η, day, ἄνθος, τό, flower) hemeranthus,

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> μαχαιρ(α)·ανθηρα (μάχαιρα, η, dagger, ἄνθηρα, flowery) Machaeranthera

2

> ζων(η)·θριξ (ζώνη, η, girdle, θριξ, η, hair) Zonothrix

25

> βορε(α)·φυτον (βορέας, δ, north wind, φυτόν, τό, plant) Boreophytum

1

> ἵππος·φυλλον (ἵππος, δ, horseman, φύλλον, τό, leaf) Hippopotophyllum

2

> γεω·πεζίς (γή, γεά, η, earth, πεζίς, η, box) Geopyxis

38:γεω-, 1

9 in γη-

2. Second declension. The stems of this declension terminate in -o, rarely in -ω, and are obtained for composition by dropping σ of the nom. sing. of masc. and fem. and ν of the neuter.

> βιο·φυτον (βίος, δ, life, φυτόν, τό, plant) Biophytum

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> ζεφυρ(ο)·ανθος (ζέφυρος, δ, west wind, ἄνθος, τό, flower) Zephyranthes

18

> ποταμο·γειτων (ποταμός, δ, river, γειτὼν, ο, η, neighbor) Potamogiton

8

> δρόσο φορός (δρόσος, η, dew, φορός, bearing) Drosophorus

1 The first number after a compound indicates the number of times the proper stem is found in composition in the Greek lexicon as the first term. Other numbers indicate the frequency of alternatives.
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3. Third declension. These may be either consonant or vowel stems. The stem is derived most readily by dropping the ending, -os, of the genitive singular.

A. Consonant stems.

(1) Stem ending in an explosive, i.e., any consonant except σ, μ, ν, λ, ρ, and τ in -ματ, nom. -μα; nominative singular ending in a double consonant, ψ or η, or in ο.

(a) Stem in a labial, π, β, φ; nominative in ψ (labial + σ).

βιτ-ο-γονατιον (βιψ, βιτος, Ṿ, rush, γονατιον, τό, small joint) Rhipogonatium

φλεβ-ο-χιτων (φλεψ, φλεβός, ḫ, vein, χιτών, δ, frock) Phlebochiton

κατηλιφ-ο-μορφη (κατηλυψ, κατηλιφός, ḫ, ladder, μορφή, ḫ, form) Cateliphomorphae

(β) Stem in a palatal, κ, γ, χ; nominative in η (palatal + η).

άλσπεκ-ο-ουρος (άλσπεξ, άλσπεκός, ḫ, fox, ουρά, ḫ, tail) Alopecurus

φλογ-ο-ακανθος (φλόξ, φλογός, ḫ, flame, ακανθος, δ, spiny plant) Phlogacanthus

(γ) Stem in a dental, τ, δ, θ, or ιτ, ιθ, κτ; nominative in ο, rarely in ρ

φωτ-ο-φοβος (φως, φωτός, τό, light, φοβός, fearing) Photophobus

ιμαντ-ο-χιτή (ιμάς, ιμάντος, δ, thong, χιτή, ḫ, long hair) Himantochaete
δόντ-ο-κυκλος (δόντις, δόντιος, ὁ, tooth, κύκλος, ὁ, ring) Odontocyclus 18
νυξ-ο-μυκης (νύξ, νυκτός, ἡ, night, μύκης, ὁ, mushroom) Nyctomycetes 28:33 in νυκτι-
κερατ-ο-στυλις (κέρας, κέρατος, τό, horn, στυλις, ἡ, pillar) Ceratostylis 16:3
στεατ- (ο)-οπια (στέαρ, στέατος, τό, tallow, ὑπός, ὁ, juice) Steatopia 3
υδατ-ο-φορα (υδωρ, υδατος, τό, water, φορά, ἡ, a carrying) Hydatophora 22
κλειδ-ο-νυμα (κλείς, κλειδός, ἡ, key, hook, νύμα, τό, thread) Clidonema 6
χλαμυδ-ο-μονας (χλαμύς, χλαμύδος, ἡ, mantle, μονάς, ἡ, unit) Clamydomonas 8
κοριθ- (ο)-αιωλον (κόρις, κόριθος, ἡ, helm, αἰώλος, nimble) Corythaeolum
ἐλμυθ-ο-σταχυς (ἐλμύς, ἐλμυθός, ἡ, worm, στάχυς, ὁ, spike) Helminthostachys 2
(2) Stem ending in a liquid, ν, λ, ρ; nominative in the same consonant, or σ.
(a) Stem in ν, nominative in ν, or σ.
χιον-ο-φιλη (χιών, χιόνος, ἡ, snow, φιλος, loving) Chionophile 17
κλων-ο-σταχυς (κλών, κλωνός, ὁ, shoot, στάχυς, ὁ, spike) Clonostachys
χην-ο-ποδιων (χην, χηνός, ὁ, ὑ, goose, ποδιων, τό, small foot) Cheno-
podium 13
deλφιν- (ο)-αστρον (δελφίς, δελφίνος, ὁ, dolphin, ἄστρον, τό, star) Delphinastrum 3
κτειν- (ο)-οδους (κτείς, κτενός, ὁ, comb, ὁδοίς, ὁ, tooth) Ctenodus 2
(b) Stem in λ, nominative in λ, or σ.
ἄλ-ο-δεκτυου (ἄλες, ἄλος, ἡ, sea, δέκτυον, τό, net) Halodictyum 4:79 in ἄλι-
(c) Stem in ρ, nominative in ρ.
ἄνδρ-ο-πωγων (ἀνήρ, ἀνδρός, ὁ, man, πώγων, ὁ, beard) Andropogon 119
ἄστερ- (ο)-ομφαλος (ἄστυρ, ἄστερος, ὁ, star, ὁμφαλος, ὁ, navel) Asteromphalus 19
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A special study of this class of imparisyllabics has been made for the sake of determining just what warrant existed in Greek for making the stem of the oblique cases the invariable form for composition. These were thought to constitute a very fair criterion on account of their wide extension, and for the further reason that they furnish a large number of alternatives, since the nominative might readily be supposed to represent a first declensional stem in -a. The Greek lexicon contains 1,782 neuters in -μα, largely secondary stems, though there are also many primary ones, these being by far the most frequent in composition. Of these 1,782 neuters, 231 are found in composition or derivation as the first term, occurring altogether in 969 derivatives. Of the 231, 208 occur in derivatives only in the proper stem form in -ματ, being used 555 times. Eleven words, ἁγαλμα, glory (13:1), ἀμα, chariot (24:1), δέρμα, skin (9:1), θαύμα, marvel (14:13), θεώρημα, theory (2:1), κέρμα, small change (3:1), κίμα, wave (19:11), κόμα, coma (2:1), ὄνομα, name (20:12), σῶμα, body (48:5) and φλέγμα, flame (12:4), show the alternative stems, ἁγαλματ- and ἁγαλμ-, though the former is preponderant, occurring in 166 derivatives, while the latter is found in only 51. Six words of this class, αἷμα, blood (32:72), ἔρμα, prop, (2:3), πώμα, drink (3:4), σπέρμα, seed (16:22), στόμα, mouth (3:24), and χέιμα, cold (1:4), occur more frequently in the shortened form, αἷμ-, the frequency being 129 to 57. Three only, δήλημα, bane (1), στάλαγμα, drop (1), and φράγμα, fence (3), are found invariably in the shortened form, while three, ἐπίσωμα, παρέγκυμα, and σίγμα occur once in each form. To sum-
marize the foregoing: of 231 neuters in -μα, which furnish stems for compounds or derivatives, 208 always appear in the proper stem form, -ματ-, 11 occur more frequently in this form, 6 more frequently in the shortened form, -μ, 3 always in this short form, while 3 occur once in either form. Of 969 words derived from these neuters, 781 show the proper stem in -ματ-, while 188 have the shortened stem in -μ.

Again, it must be borne in mind that, while these alternative stems are a source of growth rather than a misfortune to the language, in nomenclature they must always lead to confusion, as analogy will sooner or later produce doublets, such as αἰματίςπέρμα and αἰμέπέρμα, in the case of every stem which enters into composition. The marked preponderance of the proper stem in compounds of this group has been considered ample warrant for extending this stem to all compounds formed from neuters in -μα.

If further warrant were needed, it is found in the fact that every neuter of this class shows the proper stem in the oblique cases, its disappearance in certain compounds being due to the use of the shortened nominative form, a use arising to a large extent out of ignorance.

αἷματ-ο-χαρίς (αἷμα, αἷματος, τό, blood, χάρις, ἡ, grace) Haematocharis
δέρματ-ο-κυβῆ (δέρμα, δέρματος, τό, skin, κυβῆ, ἡ, head) Dermatocybe
πώματ-ο-δέρρες (πῶμα, πώματος, τό, drink, δέρρες, ἡ, leather coat) Pomatoderris
θαυματ-ο-πτερίς (θαυμα, θαυματος, τό, wonder, πτερίς, ἡ, fern) Thaumatopteris
σπέρματ-ο-χνος (σπέρμα, σπέρματος, τό, seed, χνός, ὄ, foam) Spermatchnous
στόματ-ο-θηκιον (στόμα, στόματος, τό, mouth, θηκιον, τό, little box) Stomatothecium
σωματ-(-ο)-άγγειον (σῶμα, σώματος, τό, body, ἄγγειον, τό, vessel) Somatangium

(4) Stem in -ες, genitive -εος (-εος), nominative usually in -ος, mostly neuters. The form for composition is obtained by dropping -εος of the genitive, or -ος of the nominative.
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κέρδ- (ο)-ουρα (κέρδος, κέρδεος, τό, trick, ουρά, ή, tail) Cerdura 4
βέλ-ο-περονη (βέλος, βέλεος, τό, dart, περονή, ή, point) Beloperone 7:1 in -η
ἀγγ-ο-φορα (ἀγγος, ἀγγεος, τό, vase, φορά, a carrying) Angophora 1
χειλ-ο-σκύφος (χείλος, χείλεος, τό, lip, σκύφος, τό, cup) Chiloscyphus 2
ἀνθ-ο-φυκος (ἀνθος, ἀνθεος, τό, flower, φύκος, τό, seaweed) Anthophybus 46:2
φυκ-ο-φυτον (φύκος, φύκεος, τό, seaweed, φυτόν, τό, plant) Phyco-phytum 3

B. Vowel stems (in -ι or -υ).

(1) Stem in -ι, nominative in -ις, masc. and fem., -ι, neut. The stem is obtained by dropping -ος of the genitive, or -ς of masc. or fem. nominative.

οψ- (ο)-ανθος (οψος, οψιος, οψεως, ή look, ἀνθος, τό, flower) Opsi-anthus

οψι-ο-καρυνυ (οψις, οψιος, οψεως, ο snake, κάρυνυ, τό, nut)

Ophiocaryum 20

πεπερι-ο-φυλλον (πέπερι, πεπεριος, τό, pepper, φυλλον, τό, leaf)

Peperiphyllum 1 in -ο

τροπι-ο-λεπις (τρόπις, τρόπιος, ή, keel, λεπις, ή, scale) Tropiolepis

φυσι-ο-γλωχις (φύσις, φύσιος, φύσεως, ή, nature, γλωχίς, ή, point)

Physioglochis 14

(2) Stem in -υ, nominative in -υς, (-αυς, -ευς, -ους) masc. and fem., -υ, neut. The stem is obtained by dropping -ος of the genitive, or -ς of the nominative.

δρυ-ο-πτερυς (δρύς, δρυνός, ή, oak, πτερύς, ή, fern) Dryopteris 11:4 in -υ

μυ- (ο)-ουρα (μύς, μυνός, ή, mouse, ουρά, ή, tail) Myura 18:2 in -υ

Here are usually placed βοϊς, γραίν, ναύς. These originally had the stem in a consonant, digamma, as βος-, but the digamma was lost, leaving third declension stems in -ο and -υ.
-a. The proper stem is obtained by dropping -os of the genitive, though these stems are quite irregular in the matter of composition.

\( \beta o-o-\gamma lηνος (\beta oυς, \beta oός, ο, \text{ox}, \gamma lηνη, \dot{\eta}, \text{eyeball}) \) ox-eyed 17: 96 in \( \beta oυς; \) 3 in \( \beta o-\gamma ρα-ο-λογυα (γραυς, \gamma ραός, \dot{\eta}, \text{old woman}, \lambda ωγυα, \dot{\eta}, \text{speech}) \) gossip 6

Anomalous nouns. A few nouns are included here, in which the stem has been more than usually reduced in the nominative, e. g., \( γαλα, \gamma ωνυ, \gamma νυ, \delta ρυ, \mu ελι. \)

\( γαλακτ-(o)-ανθος (γαλα, γαλακτος, τό, milk, άνθος, τό, flower) \) Galactanthus 19

\( γονατ-ο-ζυγον (γόνυ, γόνατος, τό, knee, ζυγόν, τό, yoke) \) Gonatozygum 2: 8 in γονυ-

\( γυναικ-ο-τροχας (γυνη, γυναικός, \dot{\eta}, \text{wife}, τροχας, \dot{\eta}, \text{shoe}) \) Gynaecotrochas 35: 1 in γυνο-

\( δορατ-ο-λωμα (δόρυ, δορατος, τό, stem, spear, λωμα, τό, fringe) \) Doratoloma 6: 21 in δορυ-

\( μελιτ-ο-ξυλον (μελι, μελιτος, τό, honey, ξυλον, τό, wood) \) Melitoxylum 10: 46 in μελι-

II. Adjectives

1. First and second declension: stems in -\( a, \) or -\( o, \) nom. sing., -\( os, \) masc., -\( os, \) -\( \eta, -a, \) fem., -\( ov, \) neut. The stem (ending in its proper thematic vowel, -\( o, \) which is also the connective) is readily obtained by dropping -\( σ \) of the nominative singular masculine:

\( \mu ακρο-\chi λαινι (\mu ακρός, \dot{α}, \text{long, large}, \chi λαίνα, \dot{η}, \text{cloak}) \) Macrochlaena 99

\( \delta ρθο-\mu ερις (\delta ρθός, \dot{η}, \text{on, straight, μερίς, \dot{η}, part}) \) Orthomeris 92

\( \varepsilon τερο-\rhoαχις (\varepsilon τερος, \alpha, \text{on, different, ράχις, \dot{η}, back}) \) Heterorhachis 125

\( \lambda ευκο-\beta ρυν (\lambda ευκός, \dot{η}, \text{on, clear, white}, \beta ρύν, τό, \text{alga, moss}) \) Leucobryum 114

\( \sigma τενο-\λοφος (\sigma τενός, \dot{η}, \text{on, narrow, λόφος, \dot{ο}, crest}) \) Stenolophus 46

\( \chi ρυσο-\nuριον (\chi ρύσεος, \eta, \text{on, golden, νύριον, τό, oleander}) \) Chrysonerium

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μεσ- (ο)-ανθημιον (μέσος, η, ov, middle, ανθημιον, τό, flower) Mesanthenum 125

ἀπλο-ταξις (ἀπλος, η, ov, simple, ταξις, η, array) Haplotaxis 9

2. First and third declension. The feminines of this group follow the first declension, the masculines and neuters the third. According to the termination of the stem of the latter, there are two groups, the one with the stem in a consonant, the other with vowel-stem.

a. Stem in a consonant, usually -ν or -τ, masc. in -ν or -σ, neut. in -ν. The stem is readily derived by dropping -ος of the genitive singular masculine.

μελαν-ο-στικτος (μέλας, αυα, αν, μελανος, black, στικτός, pricked) Melanostictus 44: μελαν-, 70

παντ-ο-φιλος (πάσ, πάσα, πάν, παντός, all, φίλος, loving) Pantophilus 114: παν-, 483

tερεν-ο-χρως (τέρην, εινα, εν, τέρενος, smooth, χρώς, δ, skin) with smooth skin 1

b. Stem in the vowel -v; nom. sing. masc. in -vσ, neut. in -v. The stem is obtained by dropping -ς of the nominative singular masculine. Adjectives in -v, unlike nouns of this class, do not take the connective -ο-. The use of the stem vowel, -v, as connective is so nearly absolute that it has seemed unwise to extend the connective -o- to this class.

ἀμβλυν-νοτος (ἀμβλύς, είνα, υ, blunt, νότος, δ, south wind) Amblynotus 3

βαθυ-φυτον (βαθύς, deep, low, φυτόν, τό, plant) bathyphytum 86

βαρυ-ξυλον (βαρύς, heavy, ξύλον, τό, wood) Baryxylum 115

βραδυ-πιττον (βραδύς, slow, πιττός, fallen) Bradypiptum 25

βραχυ-οδος (βραχύς, short, small, οδός, δ, tooth) Brachyodus 52

γλυκυ-ριξα (γλυκύς, sweet, ρίξα, η, root) Glycyrrhiza 30:2 in Glykko-

δρυμ-φυλλον (δρυμύς, sharp, φύλλον, τό, leaf) Drimyphyllum 3

ευρυ-βασις (εύρυς, wide, broad, βάσις, η, step, base) Eurybasis 66

ηδυ-οσμος (ηδύς, sweet, οσμή, η, smell) Hedyosmus 58

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Frederic E. Clements

θηλυ−χιτων (θηλύς, female, tender, χιτών, ὀ, frock) Thelychiton

 iota-thrix (ιθίς, straight, θρίξ, ἦ, hair) Ithythrix

 δέχο−ακανθα (δέχος, sharp, ἀκανθα, ἦ, thorn) Oxyacantha

 παχυ−ουρα (παχύς, thick, stout, οὐρά, ἦ, tail) Pachyura

 πλατυ−κώδων (πλατύς, wide, broad, κώδων, ὀ, ἦ, bell) Platycodon

 πολυ−γαλα (πολύς, much, many, γάλα, τό, milk) Polygala

 τραχυ−στήμων (τραχύς, rough, rugged, στήμων, ἦ, thread) Trachystemon

 Third declension: stem endings various; nominative in -ης, -ες,

-ων, -ος, -ες, -υς, -ος, -ωρ, -ος; in one ending, -ας, -ης,

-ις, -ης, or in the form of all nouns from which adjectives

are derived without change (see last term). The form for

composition is best obtained by dropping -ος of the geneti

ve singular (-ος of contracts, nom. -ης, -ες).

 πληρ−(ο)−ασκος (πλήρης, es, full, filled, ἀσκός, ὀ, leathern bag)

 Plerascus

 γενό−ο−λινον (γενόθης, ες, false, λίνον, τό, flax, thread) Pseudo−

linum

 πεπο−ο−σικνος (πέπων, ον, πέπωνος, ripe, σικνος, ὀ, gourd) a kind

of gourd

 τροφι−(ο)−ανθος (τρόφις, τρόφιος, well-fed, ἄνθος, τό, flower)

 Trophianthus

 ἀρρεν−(ο)−αχνη (ἀρρην (ἀρσην), εν, ἀρρενος, male, ἅχνη, ἦ, down)

 Arrhenachne

 νομαδ−ο−κνητις (νομάς, νομάδος, roaming, κύστις, ἦ, bladder)

 Nomadocystis

 συγκλυδ−ο−στορα (σύγκλυς, συγκλύδος, brought together, στορά, ἦ, seed) Synclcodospora

 Irregular Adjectives

 μεγαλ−ο−χλον (μέγας, μεγάλη, μέγα, μεγάλου, great, χλόη, ἦ, grass)

 III. Numerals

1. Cardinals. εἴς, δίο, τρεῖς, τέσσαρες are declined; the numbers

from πέντε through ἐκατόν are indeclinable. The first four

numerals rarely appear in the normal form in composition:
εις is represented by μόνος, η, ον, alone, one, δώ, by δι-, τρεῖς by τρι-, and τέσσαρες by τετρα-. The last three very rarely elide, and only before i or a. The numerals from πέντε to δώδεκα should terminate in -α when compounded.

μονο-θρις (μόνος, η, ον, one, θρις, ή, hair) Monothrix

δι-ων (δι-, two- φίν, τό, egg) Dioum

τρι-κερατιον (τρι-, three-, κεράτιον, τό, little horn) Triceratium

τετρά-ακτις (τετρα-, four-, ἀκτίς, ή, ray) Tetractis

πεντα-πέλτη (πέντε, five, πέλτη, ή, small shield) Pentapelte

δεκα-βλεφαρίς (δέκα, eight, βλεφαρίς, ή, eyelash) Octablepharis

δεκα-ραφή (δέκα, ten, ράφη, ή, seam) Decarrape

2. Ordinals, and the higher cardinals in -ος, enter into composition in the same manner as adjectives in -ος.

πρωτο-κόκκος (πρῶτος, η, ον, first, κόκκος, δ, berry) Protococcus

μυριο-φιοσ (μυρίος, α, ον, numberless, φίοσ, ή, bubble) Myriophyssa

χίλιο-φιλλον (χίλιοι, αι, a, thousand, φύλλον, τό, leaf) Chilio-phyllum

IV. Indeclinables

1. Adverbs. These are rare in nominal compounds. They are attached immediately to the second member.

ἀγκιστορος (ἀγκι, near, στορά, ή, seed) near of kin

δεκα-χρύσου (δέκα, ever, χρύσος, golden) Aichrysum

ἀπαξ-ανθος (ἀπαξ, once, once only, ἀνθος, flowering) hapaxanthus

ἀρτη-μαλλη (ἀρτη, just, exactly, μαλλός (θ'μαλός) δ, shoot) just blooming

ευ-ραμυον (ευ, right, true, ραμυνος, ή, thorn) Eurhamnus

χαμαι-νηρον (χαμαι, on the ground, νήρον, τό, oleander) Chamaenerium

2. Prepositions. These are attached directly to the second member. The final vowel is elided before an initial vowel (except in περί, and πρό), and if the latter be aspirated, a preceding smooth explosive is roughened. Εκ becomes εκ before a vowel.

ἀμφιμονης-δοναξ (ἀμφι, on both sides οι, δοναξ, δ, reed) Amphidonax

ἀνα-χαρις (ἀνά, on, upward, χαρις, ή, grace) Anacharis

δια-φανη (διά, through, φανός, bright) Diaphane

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Latin has developed derivation enormously, while composition has had a relatively feeble development. This is explained by the fact that derivation must have maintained the lead which it doubtless acquired during the formative period of the language, and, also, by the fact that the need for compound words during the classic and post-classic periods was supplied by repeated and extensive borrowing from Greek. Derivation has, in consequence, a much greater importance for the nomenclator than composition, a condition quite contrary to that which prevails in Greek. As in the latter language, nominal derivatives are formed by adding noun or adjective suffixes to roots or stems.
NOUN SUFFIXES

Agent

-TOR (-SOR), m., -TRIX, f., primary or secondary verbal; rarely
    denominative: da-tor, giver; ora-tor, speaker; ton-sor,
    barber; via-tor, traveler; impera-tor, commander;
    pisca-tor, fisherman
-ES (stem -T, -IT, -ET), m. or f., primary: ped-es, walker; com-
    es, companion; tram-es, pathway
-O (stem -ON) m., primary: combib-o, pot-companion; ger-o,
    porter
-ARIUS, m., primary or secondary, verbal or denominative:
    ferr-arius, smith; pisc-arius, fishmonger

Means or Instrument

-BULUM, n., primary or secondary, usually verbal: pa-bulum,
    fodder; vesti-bulum, court
-CULUM (-CLUM), -CRUM, n., primary or secondary, usually
    verbal: sar-culum, hoe; vin-clum, fetter; ful-crum, sup-
    port
-BRUM, n., -BRA, f., primary or secondary, verbal: cri-brum,
    sieve; fla-brum, blast; tere-bra, borer
-TRUM, n., -TRA, f., -TER, m., primary or secondary: plaus-trum,
    wagon; mulc-tra, milk-pail; cul-ter, knife
-MEN, -MENTUM, n., primary or secondary, usually verbal:
    teg-men, cover; funda-mentum, foundation

Action or Result

-OR, -IS, m., -ES, f., -US, n. (stem -OR, -ER), primary: cal-or,
    heat; lab-or, toil; cin-is, ashes; pulv-is, dust; caed-es,
    a setting-down; nub-es, cloud; fun-us, burial; on-us,
    burden
-TUS (-SUS), mostly masculine, primary: fruc-tus, fruit; pas-
    tus, food; vic-tus, food; sen-sus, perception
-IO (stem -ION), f., secondary verbal, rarely primary: obsid-io,
    siege; reg-io, district
-TIO (-SIO), (stem -TION), primary or secondary verbal: aue-
    tio, increase; huma-tio, burial; conver-sio, alteration
-TURA (-SURA), primary or secondary verbal: tex-tura, web;
    commis-sura, joint
-MEN, -MENTUM, n., primary or secondary verbal: frag-men, piece; arma-mentum, equipment
-MONIUM, n., -MONIA, f., primary or secondary, verbal or denominative: testi-monium, testimony; ali-monia, support; sancti-monia, sanctity

Quality
-IA, -TIA, f., secondary denominative: audac-ia, boldness; pa-tient-ia, patience; nigri-tia, blackness
-IES, -TIES, f., secondary denominative: pernic-ies, ruin; segni-ties, laziness
-DO, f., secondary denominative or verbal: arun-do, reed; hiru-do, leech; dulce-do, sweetness
-GO, f., secondary denominative or verbal: albu-go, whiteness; lanu-go, down; rubi-go, redness, rust
-TAS, -TUS, f., secondary denominative: cavi-tas, hollow; celeri-tas, swiftness; pleni-tas, fulness; senec-tus, old age
-TUDO, f., secondary denominative: ampli-tudo, width; crassi-tudo, thickness
-IUM, -TIUM, secondary denominative or verbal: auspic-i-um, omen; hospit-i-um, inn; servi-tium, slavery
-ASTER, m., secondary denominative: cle-aster, wild olive

Place
-ARIUM, n., primary or secondary denominative: avi-arium, poultry-yard; herb-arium, place for plants; virid-arium, garden
-ETUM, -TUM, n., primary or secondary denominative: caric-etum, field of sedges; fruti-cetum, thicket; ros-cetum, rose-garden; arbus-tum, grove; salic-tum, willow grove
-ILE, n., primary denominative: bov-ile, cattle yard; ov-ile, sheepfold
-TORIUM, n., secondary denominative: audi-torium, lecture room; ora-torium, oratory

Diminutives
-ULUS (-OLUS after a vowel), primary or secondary denominative: glob-ulus, little globe; herb-ula, little herb; capit-ulum, little head; atri-olum, little hall; osti-olum, little mouth
-CULUS, -UNCULUS, primary or secondary denominative; mus-culus, little mouse; nube-cula, little cloud; oper-culum, little lid; cent-unculus, cloth of many colors; orati-uncula, little speech
-ELLUS, -ILLUS, primary or secondary denominative: mis-ellus, wretch; lam-ella, small leaf; pat-ella, small dish; penic-illus, hair pencil; osc-illum, little face
-UNCIO, secondary denominative: hom-uncio, manikin

The gender of diminutives is regularly that of the stem to which they are attached.

Patronymics. These are formed by the regular Greek suffixes, which have given rise in Greek to adjectives that have become nouns in Latin.

ADJECTIVE SUFFIXES

Ownership or Relation
-ANUS, -ENUS, -INUS, primary or secondary denominative: pagn-anus, rustic; ser-enus, calm; mar-inus, of the sea
-ACUS, -ICUS, primary or secondary denominative: pausi-acus, olive-colored; hepat-icus, liver-colored
-ALIS, -ELIS, -ILIS, -ULUS, primary or secondary denominative: litor-alis, of the shore; hum-ilis, lowly; ed-ulis, edible
-ARIS, -ARIFUS, -TORIUS, primary or secondary denominative: milit-aris, martial; lamin-arius, blade-like; desul-torius, of a vaulter
-ATUS, -ITUS, -UTUS, primary or secondary denominative: ped-atus, having a foot; turr-itus, turreted; hirs-itus, rough
-EUS, -EIUS, -ICIUS, primary or secondary denominative: frond-eus, leafy; pleb-eius, of the commons; advent-icius, foreign

Material
-ACEUS, -ICIUS, primary or secondary denominative: ochr-aceus, of ochre; viol-aceus, violet-colored; later-icius, brick red
-EUS, -IUS, -EIUS, primary or secondary denominative: lign-eus, of wood; ros-eus, rosy; aur-eus, golden; limon-ius, lemon yellow; chalyb-eius, of steel

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-INUS, -INEUS, -GNUS, primary or secondary denominative: lilac-inus, lilac-colored; querc-inus, oaken; frax-ineus, ashen; fulig-ineus, soot-black; abie-gnus, of fir-wood; sali-gnus, of willow

Quality or Fitness
-AX, primary: ten-ax, tenacious; rap-ax, furious; vor-ax, consuming
-IDUS, -ULUS, primary: flor-idus, blooming; morb-idus, diseased; cred-ulus, trustful; pend-ulus, hanging
-VUS (-UUS), -IVUS, -TIVUS, primary or secondary verbal or denominative: decid-uus, apt to fall; aest-ivus, of summer; fugi-tivus, fleeing
-IUS, primary or secondary denominative or verbal: patr-ius, paternal; exim-ius, choice
-ILIS, -BILIS, -TILIS (-SILIS), secondary verbal: flex-ilis, flexible; fac-ilis, easy; nota-bilis, noteworthy; plica-tilis, twisted; fos-silis, dug up

Fulness
-OSUS, secondary denominative: form-osus, beautiful; silv-osus, forested; lim-osus, muddy
-(O)LENS, -(O)LENTUS, primary or secondary denominative: grave-olens, of heavy odor; succu-lentus, fresh, full of juice; lutu-lentus, muddy
-BUNDUS, -CUNDUS, primary or secondary verbal, rarely denominative: erra-bundus, vagrant; fe-cundus, fruitful; rubi-cundus, ruddy

Place or Origin
-ANUS, -ANEUS, -ENUS, primary or secondary denominative: mont-anus, of the mountains; subterr-aneus, underground; terr-enus, earthy
-ENSIS, primary or secondary denominative: for-ensis, of the market place; padov-ensis, of Padua
-ESTER, (-ESTRIS), -TER (-TRIS), primary or secondary denominative: camp-ester, of the fields; silv-estris, forest; lacus-ter, of a lake; palus-tris, marshy
-TIMUS, secondary denominative: mari-timus, of the sea; fini-timus, bordering

**Time**

-ANUS, primary or secondary denominative: anteluc-anus, before daybreak; meridi-anus, of midday; cotidi-anus, daily

-ERNUS, (-TERNUS), -URNUS (-TURNUS), primary or secondary denominative: hib-ernus, wintry; sempi-ternus, everlasting; di-urnus, by day; noct-urnus, nocturnal

-NUS, secondary denominative: autum-nus, of autumn; vernus, vernal

**Diminutives**

-ULUS (-OLUS), secondary denominative: frigid-ulus, chilly; lute-olus, yellowish

-CULUS, secondary denominative, especially common with the neuter of the comparative: minus-culus, somewhat smaller; crassius-culus, somewhat thick

**COMPOSITION**

Latin, like Greek, exhibits two methods of composition, syntactic and non-syntactic. The former, found in such compounds as aquaeductus, nomenclator, respublica, and paterfamilias, is rare and archaic, and needs to be noticed only to call attention to its use in specific names, such as urticaefolia, menthaeflora, etc., which should be treated as non-syntactic and written urticifolia, menthillora, etc. Non-syntactic composition has been developed to a certain extent in Latin, but the language is far inferior to Greek in this regard. Latin has largely obviated the need of composition by a wide extension of derivation, with the result that composition always seems awkward and foreign to the language. Notwithstanding this, Latin has a large number of compounds, mostly adjectives, which have been used by biologists, and new compounds will doubtless be made upon the model afforded by these. It should be borne in mind that derivation by suffixes is the easy and natural method of word formation in Latin, as composition is the natural way in Greek, and a desir-
able working rule might be formulated to the effect that derivatives be taken from Latin and compounds from Greek. Linne\textsuperscript{1} has written as follows upon this point: "Nomina generica ex duobus vocabulis latinis integris \& conjunctis composita, vix toleranda sunt. Ejusmodi vocabula, graeca lingua pulcherrima sunt; at Latina non facile eadem admittit. Admissimus nonnulla vocabula latina, sed non ideo in posterum imitanda sunt."

\textbf{THE LAST TERM}

The last term is a noun, adjective, or verbal stem. According to the nature of the last term, its form is as follows:

I. If the last term is a noun, the compound (1) will be a noun:

- angi-portus (*angus, strait, portus, harbor) a narrow street
- ante-cursor (ante, before, cursor, runner) forerunner, vanguard
- tri-dens (tri, three, dens, tooth) trident
- nemori-cultrix (nemus, nemoris, forest, cultrix, cultivator) forest-lover
- mani-pretium (manus, hand, pretium, price) workman's pay
- albo-galerus (albus, white, galerus, hat) white hat of a flamen

(2) or the compound will be an adjective, appearing in one of three forms: (1) us, a, um; (2) is, e; (3) the form of the noun.

(a) If the last term belong to the first, second, or fourth declension (stem in -a, -o, and -u, respectively), the compound adjective will regularly take the terminations of the first and second declensions (us, m., a, f., um, n.), or it may take the endings of the third declension (is, m., f., e, n.)

- in-formis (in, not, forma, form) formless
- igni-comus (ignis, fire, coma, hair) fiery-haired
- magni-sonus (magnus, great, sonus, sound) loud-sounding
- multi-vius (multus, many, via, way) having many ways
- albi-cerus, albi-ceris (albus, white, cera, wax) wax-white

\textsuperscript{1}Linne. Philosophia Botanica, 100. 1751.
uni-cornis, uni-cornus ( unus, one, cornu, horn) with one horn
angui-manus ( anguis, snake, manus, hand) with serpent hand
magn-animus, magn-animus ( magnus, great, animus, soul) great-souled
long-aevus ( longus, long, aevum, age) of great age
multi-jugus, -jugis ( multus, many, jugum, yoke) yoked many together
multi-meter ( multus, many, metrum, measure) of many feet

(b) If the last term belong to the third declension (stem in a consonant or in -i) the compound adjective will have the form and inflection of a noun, or its stem may take the endings us, a, um, or, more rarely, is, e.
aequi-lanx ( aequus, equal, lanx, scale) with equal scale
in-frons ( in, without, frons, leaf) without foliage
nigri-color ( niger, black, color, color) of a black color
multi-pes ( multus, many, pes, foot) many-footed
multi-radix ( multus, many, radix, root) many-rooted
uni-finis ( unus, one, finis, limit) possessing the same termination

semi-bos ( semi, half, bos, ox) half-ox
bi-dens ( bi, two, dens, tooth) two-toothed
aequi-pes, aequi-pedis ( aequus, equal, pes, foot) isosceles
in-orus ( in, not, os, oris, mouth) without a mouth
multi-coloris ( multus, many, color, coloris, color) many-colored
multi-nominis ( multus, many, nomen, nominis, name) many-named
multi-genus, -generus, -generis ( multus, genus, generis, kind) of many kinds
multi-laundus ( multus, laus, laudis, praise) much-praised
aequi-latus, aequi-laterus ( aequus, equal, latus, lateris, side) equilateral

(c) If the last term belong to the fifth declension, the compound adjectives will appear in us, a, um, or, rarely, in the form of a noun.
levi-fidus (levis, light, fides, faith) of little faith
per-di-um (per, through, dies, day) throughout the day
ex-spes (ex, out of, spes, hope) hopeless

II. If the last term is an adjective, it will not be changed, though
noun suffixes may be added to it, thus making a sub-
stantive.
igni-potens (ignis, fire, potens, powerful) potent in fire
aequi-par (aequus, even, par, equal) perfectly equal
semi-sepultus (semi, half, sepultus, buried) half buried
anim-aequus (animus, mind, aequus, even) not easily moved
albo-gilvus (albus, white, gilvus, pale-yellow) whitish yellow
longi-vivax (longus, long, vivax, tenacious of life) long-
lived

III. If the last term is a verbal stem, the compound may be a
noun of the first or third declension, or an adjective of
three terminations or one termination.
limi-cola (limus, mud, colo, dwell) a mud-dweller
lapi-cida (lapis, lapidis, stone, caedo, cut) a stone-cutter
tubi-cen (tuba, trumpet, cano, sing) a trumpeter
man-ceps (manus, hand, capio, take) purchaser
frugi-legus (frux, frugis, fruit, lego, collect) fruit-gathering
herbi-gradus (herba, grass, gradior, go) going in the grass
multi-fidus (multus, many, findo, cleave) many-cleft
gemmi-fer (gemma, bud, fero, bear) bearing buds
spini-ger (spina, thorn, gero, bear) thorn-bearing

THE CONNECTIVE

The connecting vowel, -i-, has been so extended in Latin that
the language practically knows no other connective. An -o- has
found its way into some words after the analogy of Greek com-
pounds, but these, as well as those in which the connecting vowel
is -u-, are so rare that all connectives other than -i- may be
entirely disregarded.

THE FIRST TERM

The first term of the compound in Latin may be a nominal
stem (noun or adjective), an indeclinable (adverb, preposition,
or inseparable particle), or more rarely a verbal stem. Nouns
are extremely rare as the first term of Latin compounds, except
where the last term is a verbal stem. Adjectives likewise, with
the exception of numerals and a few common words such as
_aequus, longus, multus_, etc., are rarely found in composition. In
consequence, the first terms of Latin compounds are very largely
made up of numerals and indeclinables, the latter taking, of
course, no connective. In Latin, inflected stems appear almost
invariably in the proper stem form. The infrequency of such
stems in composition doubtless accounts for this uniformity.

**Nouns**

- *lani-pes* (lana, wool, pes, foot) with wool on the feet
- *limi-genus* (limus, mud, gigno, bring forth) mud-born
- *grani-fer* (granum, grain, fero, bear) grain-bearing
- *funi-repus* (funis, rope, repo, creep) rope-dancer
- *frugi-ferens* (frux, frugis, fruit, ferens, bearing) fruitful
- *corpori-cida* (corpus, corporis, body, caedo, cut) butcher
- *ori-putidus* (os, oris, mouth, putidus, fetid) with vile mouth
- *corni-frons* (cornu, horn, frons, forehead) with horned fore-
  head
- *lacu-turris* (lacus, lake, turris, tower) a kind of cabbage
- *fidei-commissum* (fides, trust, committo, commit) a bequest
  in trust

**Adjectives**

- *laeti-ficns* (laetus, glad, facto, make) gladdening
- *soli-vagus* (solus, alone, vagor, wander) wandering alone
- *tardi-gradus* (tardus, slow, gradior, walk) slow-paced
- *atri-capillus* (ater, black, capillus, hair of the head) black-
  haired
- *grandi-scapius* (grandis, great, scapus, stem) having a large
  stem
- *levi-caulis* (levis, smooth, caulis, stem) smooth-stemmed
- *pleuri-laterus* (plus, pluris, more, latus, lateris, side) with
  several sides
- *serpenti-pes* (serpens, creeping, pes, foot) serpent-footed
NUMERALS. Unus, centum, the higher cardinals and all ordinals appear in the stem form with -i- as the connective, the remaining cardinals are unchanged: duo, two, is replaced by bi-, tres, three, by tri-, and quattuor, four, by quadri-.

uni-folius (unus, one, folium, leaf) one-leaved
bi-fidus (bi, two, findo, cleave) cleft into two parts
tri-furcus (tri, three, furca, prong) three-pronged
quadri-jugis (quadri, four, jugum, yoke) yoked in fours
quinque-partitus (quinque, five, partio, divide) five-parted
septem-nervus (septem, seven, nervus, nerve) seven-nerved
decem-remis (decem, ten, remus, oar) ten-oared
centi-ceps (centum, hundred, caput, head) hundred-headed
primi-formis (primus, first, forma, form) original
quinti-ceps (quintus, fifth, caput, head) having five peaks

INDECLINABLES
Adverbs and adverbial prefixes:
semper-florium (semper, always, flos, flower) evergreen
paen-ultimus (paene, nearly, ultimus, last) last but one
per-magnus (per, very, magnus, large) very large
praef-longus (praee, very, longus, long) very long
in-divisus (in, not, dividio, divide) undivided
sub-globosus (sub, rather, somewhat, globosus, spherical) nearly spherical

Prepositions:
ab-normis (ab, away from, norma, rule) irregular
ac-clivus (ad, to, clivus, slope) steep
ante-pes (ante, before, pes, foot) forefoot
circum-scissus (circum, around, scindo, split) split around
com-mutabilis (cum, together with, mutabilis, changeful) subject to change
de-jugis (de, from, jugum, yoke) sloping
ex-aridus (ex, out, aridus, dry) dried out
in-fuscus (in, in, fuscus, dark) dark-brown
inter-nodium (inter, between, nodus, knot) internode
ob-stipus (ob, towards, stipes, stalk) bent to one side
super-nans (super, above, no, swim) swimming at the top
Inseparables:

ambi-formis (ambi, around, forma, form) of doubtful form
dis-calceatis (dis, without, calceo, put on shoes) barefooted
re-formatus (re, back, again, firmo, fix) re-establish
se-jugis (se, apart, jugum, yoke) disjoined
ve-grandis (ve, out, not, grandis, large) not very large, small

ALTERNATIVES

Duplicate names or terms may arise in nomenclature from alternative words, stems, connectives, or terminations, or from the alternative use of nouns, adjectives, and verbal stems from the same root to form the last term of a compound. In Latin, alternatives cause little trouble because of the slight development of composition, and for the reason that Latin derivatives are largely specific. In Greek, the confusion arising from alternatives is great, and it is imperative that composition be made to conform to certain definite rules. An observance of the following rules in making compounds will aid greatly in preventing the occurrence of real duplicates, as well as the occurrence of extremely similar, though perfectly distinct compounds, which are a source of vexation to many biologists.

(1) When the language shows two or more alternative words, such as χάσμα and χάσμη, γράμμα and γραμμή, γραφές and γραφή, the more primitive word should be chosen. As this involves a considerable knowledge of Greek, the only safe plan is for the coiner to make sure that his proposed compound does not appear in an alternative form. This may be readily done at the same time that he assures himself that the word does not already exist in his science in the form in which he proposes it.

(2) Duplicates arising from alternative stems and connectives are readily avoided by observing the rule already suggested, viz., that the proper connective is always -ο in Greek and that words always enter into composition in the full stem form.

(3) Since a root may often appear in the first term of the compound as a noun, adjective, or verbal stem, it is advisable that the coiner of a name should avoid using a root already found in either of its other forms in composition with the same last term.
(4) The last term of a generic name should be a noun. Although such compounds usually become adjectives in Greek, the confusion which thus arises from alternative endings or gender terminations can only be avoided by restricting such compounds to the form and gender of the noun of the last term, i. e., the last term of a compound should always remain unchanged.

(5) Verbals should be invariably avoided in compounding nouns and adjectives, i. e., in all the composition found in nomenclature. A compound of identical or similar meaning can always be secured by employing a noun or adjective, and the use of verbal stems, in many ways peculiar, should be left to the philologist.

(6) The repeated use of different suffixes in connection with the same generic compound, or indeed with the same last term, should be carefully avoided.

(7) The alternative termination of Latin compound adjectives in -us and -is, though hardly productive of any real difficulty, might well be avoided for the sake of the biologist who does not understand that these are merely alternative endings. Saint-Lager\(^1\) has suggested that terminations in -us be assimilated to -is, and this suggestion might well be carried out, although the -us termination has the slight advantage of indicating gender somewhat more definitely.

**ACCENT**

The accent of all Greek and Latin derivatives in science is determined by the accentuation of Latin, since all Greek words after transliteration are governed, of course, by the usual rules of accent for Latin words. These are as follows:

(1) The ultimate is never accented.
(2) In words of two or more syllables the accent is on the penult when this is long; when the penult is short, the antepenult is accented.

**GENDER**

The gender of a name is the gender of the last term in its proper language, whether the termination conform or not. The

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\(^1\)Saint-Lager. Chapitre de Grammaire à l'usage des botanistes. 1892.
Gender of the primitive may be changed at any time, of course, by the addition of a proper suffix of a different gender. The most frequent mistakes in the matter of gender occur in connection with Greek neuters in -a, -as, and -os; thus, γάλα, milk, and κρίας, meat, are usually regarded as feminines, when found as the last term of a compound, and ἀνθός, flower, as masculine.

**CORRECTION LIST**

In this list are included a number of the more common generic names which show improper formation. No attempt has been made to make the list exhaustive, as this would be an idle expenditure of time until there is a wider appreciation of the necessity of placing nomenclature upon a classical basis. The names given here serve simply as examples of the malformations which abound throughout biological nomenclature. The duplicate names which arise from malformations or from alternatives are discussed under section IV.

I. Compound with improper stem, often also with faulty connective.

Acianthus = Acidanthis (ἀκίς, ἀκίδος, ἡ, point)

Acilepis = Acidolepis

Acispermum = Acidosperma (σπέρμις, σπέρματος, τό, seed)

Acleisanthus = Acleanthus (ἀκλείς, inglorious)

Acrosanthus = Acranthus (ἀκρός, a, ov, at the point, highest)

Agrostistachys = Agrostidostachys (ἀγροστής, ἰδος, ἡ, grass)

Amblirion = Amblylirium (ἀμβλῦν, blunt, dull)

Amianthium = Amiantanthium (ἀμιανθός, ov, pure)

Chimophila = Chimatophiln (χιμόη, χιμάτος, τό, cold, frost)

Chiococca = Chionococcus (χιόν, χιόνος, ἡ, snow)

Chiogenes = Chionogenes

Chroococcus = Chrotococcus (χρώς, χρωτός, δ, skin, color)

Colesanthes = Coleanthus (κολέας, δ, sheath)

Cybianthus = Cybanthus (κυβή, ἡ, head)

Cynosurus = Cynura (κύων, κυνός, δ, dog)

Dasanthera = Dasyanthera (δάσως, shaggy, cfr. δάσος, shagginess)
Dermosporium = Dermatosporium (δέρμα, δέρματος, τό, skin)
Dermocybe = Dermatocybe
Eilemanthus = Ilematanthus (ειλήμα, ειλήματος, τό, veil)
Epigynanthus = Epigynaecanthus (γυνή, γυναικός, ἥ, woman)
Galanthus = Galactanthis (γάλα, γάλακτος, τό, milk)
Galarhoeus = Galactorrhoeus
Gasteranthus = Gastranthis (γαστήρ, γαστρός, ἥ, belly)
Geropogon = Gerontopogon (γέρων, γέρωντος, ὁ, old man)
Gigandra = Gigantandra (γίγας, γίγαντος, ὁ, giant)
Gynopogon = Gynaecopogon (γυνή, γυναικός, ἥ, woman)
Haemocarpus = Haematocarpus (αἷμα, αἷματος, τό, blood)
Hedysarum = Hedyarum (ῥοῦς, sweet, but ῥοδός, Diosc. !)
Helixanthera = Helicanthera (ἐχῖνος, ἴχνος, twisted)
Homalobus = Homalolobus (ὁμαλός, even, equal), hardly Homolobus (ὁμός, one and the same)
Ilysanthus = Ilyanthus (ἰλύς, ἥ, mud)
Iondraba = Iodrabe (ἰον, τό, violet)
Ionactis = Iactis
Isanthus = Isanthus (ἰσός, equal)
Kalosanthus = Calanthus (καλός, beautiful; better, Callianthus, καλλι-)  
Korycarpus = Corythocarpus (κόρυς, κόρυθος, ἥ, helmet)
Lacistema = Lacidostema (λακίς, λακίδος, ἥ, rent)
Leontostomium = Leontostomatium (στόμα, στόματος, τό, mouth)
Lepargyraea = Lepidargyraea (λεπίς, λεπίδος, ἥ, scale, also λέπος, τό, scale)
Lepicystis = Lepidocystis
Lepisanthus = Lepidanthus
Manisuris = Manura (μανός, rare, porous)
Megacephalum = Megalocephalum (μέγας, μεγάλον, great)
Megapterium = Megalopterium
Megasanthus = Megalanthus
Melasanthus = Melananthus (μέλας, μέλανος, black)
Melianthus = Melitanthus (μέλι, μελιτός, τό, honey)
Melilotus = Melitolotus
Myosurus = Myura (μύος, μῦός, ὁ, mouse)
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Namaspora = Namatospora (νάμα, νάματος, τό, stream)
Nemacladus = Nematocladus (νήμα, νήματος, τό, thread)
Nemastylis = Nematostylis
Onygena = Onychogenes (όνυξ, ονυχος, ὁ, nail, claw)
Oonopsis = Oopsis (φώ, τό, egg)
Ophispermum = Ophiosperma (ὀφίς, ὀφιος, ὁ, snake)
Pachysandra = Pachyandra (παχύς, thick)
Pachyanthus = Pachyanthus
Peliosanthus = Pelianthus (πελιός, livid)
Pholistoma = Pholidostoma (φολίς, φολίδος, ὦ, horny scale, spot
Pyxipoma = Pyxidopoma (πυξίς, πυξίδος, ὦ, a box of boxwood)
Raphiolepis = Rhaphidolepis (ῥαφίς, ῥαφίδος, ὦ, needle)
Regmandra = Rhegmatandra (ῥήγμα, ῥήγματος, τό, fracture)
Rhexantha = Rhexianthe (ῥῆξις, ῥήξεως, ὦ, rending, rent)
Salpianthus = Salpinganthus (σάλπιγξ, σάλπιγγος, ὦ, war-trumpet)
Salpianthus = Salpinganthus
Schismoceras = Schismatoceras (σχίσμα, σχίσματος, τό, cleft; cfr. σχισμή, ὦ)
Scolosanthus = Scolanthus (σκόλος, ὦ, stake; better, Scolopanthus from σκόλος, ὦ)
Spermacoce = Spermatocece (σπέρμα, σπέρματος, τό, seed)
Spermolepis = Spermatolepis
Stachysanthes = Stachyanthus (στάχυς, στάχυνος, ὦ, spike)
Stemastrum = Stematastrum (στέμα, στήματος, τό, stamen)
Stigmanthus = Stigmatanthus (στίγμα, στίγματος, τό, point; cfr. στιγμή, ὦ)
Thisantha = Thinanthe (θήσ, θηνός, ὦ, sand)
Thrixspermum = Trichosperma (θρής, τριχός, ὦ, hair)
Toxylon = Toxoxylum (τοξόν, τό, bow)
Tremanthus = Trematanthus (τρήμα, τρήματος, τό, hole)
Trichosanthes = Trichanthus (θρίξ, τριχός, ὦ, hair)

II. Compounds with improper connective.
Acanthophippium = Acanthephippium (ἀκανθα, ὦ, thorn, ἑφίππιον, τό, saddle)
Actegiton = Actogiton (ἀκτή, ὦ, headland, seacoast)
Acteaphila = Actophila

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Aloexylon = Alo(o)xylum (ἀλόγη, ἦ, aloe)
Amaracarpus = Amarocarpus (ἀμάρα, ἦ, trench)
Amb yocarpum = Amblycarpum (ἀμβλαύς, blunt)
Amecarpus = Amocarpus (ἀμη, ἦ, matlock)
Ammodenia = Ammadenia (ἀμμος, ἦ, sand, ἀδὴν, ὦ, gland)
Ampelygonum = Ampelogony (ἀμπέλος, ἦ, vine)
Amphiorhox = Amphirrhox (ἀμφί, around, on both sides)
Andriopetalum = Andropetalum (ἄνθροπος, ἦ, man)
Andriopetalum = Andropetalum (cfr. ἄνθρωπον, τό, manikin)
Anthephora = Anthophora (ἄνθος, τό, flower, cfr. ἄνθη, ἦ)
Artanema = Artonema (ἀρτος, ὦ, loaf of bread)
Batheogyne = Bathogyne (βαθύς, deep, high)
Beloanthera = Belanthera (βέλος, τό, dart)
Blephariglottis = Blepharidoglottis (βλεφαρίς, ἰδος, ἦ, eyelash, cfr. βλέφαρον, τό, eyelid)
Blepharispermum = Blepharidosperma
Botryceras = Botryoceras (βότρυς, βότρυνος, ὦ, cluster of grapes)
Brachyolobus = Brachylobus (βραχύς, short)
Chorioactis = Choriactis (χορίον, τό, membrane)
Coreopsis = Coriopsis (κόρις, κόριος, ὦ, bug)
Corispermum = Coriosperma
Cypripedium = Cypridopedium (Κύπρις, ἰδος, ἦ, Aphrodite)
Dacrymyces = Dacryomyces (δάκρυον, τό, tear, cfr. δάκρυ, τό)
Dacrycarpos = Dacryocarpus
Dasiphora = Dasiphora
Dasyochoa = Dasychoe (δασιός, shaggy)
Dictyderma = Dictyoderma (ἀδικτυον, τό, fishing net)
Endespermum = Endosperma (ἐνδον, within)
Gaiadendron = Gaiodendrum (γαῖα, ἦ, earth; better, Geoden-drum from γῆ)
Glyphyllaea = Glyphidophyllaea (γλυφίς, γλυφίδος, ἦ, notch)
Graphephorum = Graphophorum (γραφής, ἦ, drawing)
Halicoccus = Halococcus (ἄλσ, ἄλος, ἦ, sea)
Halyseris = Haloseris
Harpaecarpus = Harpocarpus (ἄρπη, ἦ, bird of prey, sickle)
Harpechloa = Harpochloe
Hebeanthe = Hebanthus (ἡβη, ἦ, youth)
III. Compounds with improper ending.

For reasons already given, the following compounds are corrected to conform to the primitive form of the last terms. Since it may not be clearly understood that certain adjective
endings are incorrect, while others are correct but confusing, a summary is given of the correct endings for compound adjectives based upon nouns of the different declensions:

First and second declension: -os, -ov

Third declension:

Stems in v, ρ, δ: no change, rarely -ov, or -ow, or -os, -ov
Stems in any other consonant, or in -es: -os, -ov
Stems in -ar, nom. -as: -ws, -ov, or -os, ov
Stems in -i or -u: no change, or -os, -ov

Acanthobotrya = Acanthobotrys (βότρυς, δ, a cluster of grapes)
Acanthocarpa = Acanthocarpus (καρπός, δ, fruit)
Acrodryon = Acrodrys (δρύς, η, oak. Acrodryus, -um is permissible but rare)

Acrospermum = Acrosperma (σπέρμα, τό, seed)
Acrotriche = Acrothrix (θρίς, τριχός, η, hair)
Amphilophis = Amphilophus (λιφός, δ, crest)
Botrytis = Botryites (βοτρύτης, δ, like grapes)
Callistachya = Callistachys (στάχυς, δ, spike)
Calycera = Calliceras (κέρας, τό, horn)
Ceratoaulis = Ceratoaulus (καυλός, τό, stalk)
Centrophyta = Centrophytum (φυτόν, τό, plant)
Chamaemelus = Chamaemelum (μήλον, τό, apple)
Cheilococca = Chilococcus (χιλικός, δ, berry)
Cyanotis = Cyanus or Cyanotus (οῦς, ωτός, τό, ear)
Cyclopeltis = Cyclopelte (πελτή, η, small shield)
Cyrtorrhyncha = Cyrtorrhynchus (ρύγχος, τό, snout)
Dasytricha = Dasythrix (θρίς, τριχός, η, hair)
Desmophlebis = Desmophleps (φλέψ, η, vein)
Didiplis = Didiplo (διπλός, διπλός, twofold)
Distichlis = Distichus (στίχος, δ, row)
Epistemum = Epistemon (στήμων, δ, warp) or Epistema (στήμα, τό, stamen)
Euchaetis = Euchaete (χαίτη, η, long hair)
Gigandra = Gigantaner or Gigantandrus (άνήρ, άνδρός, δ, man)
Glossocomia = Glossocome (γλώς, η, hair)
Glycyosmis = Glycyosme (δόμη, η, smell)
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Grammitis = Grammatites (γράμμα, ἄτος, τό, line, -μής)
Gyrocerus = Gyroceras (κέρας, τό, horn) or Gyroceros (κερώς, ὁ, horned)

Haplolepeidae = Haplolepis (λεπίς, ὁδός, ἦ, scale) or Haplopidus
Haplophlebia = Haplophleps (φλέψ, ἦ, vein)
Hedycrea = Hedycreas (κρέας, τό, meat)
Hippurus = Hippura (ὀῦρα, ἦ, tail, but ἵππωρις, horse-tailed)
Hydrangea = Hydrangium (ἄγγειον, τό, vessel)
Lagopoda = Lagopus (πούς, ποδός, ὁ, foot)
Lagotis = Lagus or Lagotus (ὀῆς, ὀτός, τό, ear)
Leptis = Leptus (λεπτός, fine, thin)
Leptostachya = Leptostachys (στάχυς, ὁ, spike)
Lycianthes = Lycianthus (ἄνθος, τό, flower)
Macroscepis = Macroscepe (σκέπη, ἦ, cover)
Melancranis = Melanocranus (κράνος, τό, helmet)
Monochila = Monochilus (χιλός, τό, lip)
Myagrum = Myagra (μυάγρα, ἦ, mouse-trap)
Nemacaulis = Nematocaulus (καυλός, ὁ, stalk)
Neurada = Neuras (νευρᾶς, ὁδός, ἦ, a plant)
Odontoptera = Odontopterum (πτερόν, τό, feather)
Oncogastra = Oncogaster (γαστήρ, γαστρός, ἦ, belly)
Pachnolepia = Pachnolepis (λεπίς, ὁδός, ἦ, scale)
Pentachaeta = Pentachaete (χαίτη, ἦ, long hair)
Phaenopoda = Phaenopus (πούς, ποδός, ὁ, foot)
Rhizobotrya = Rhizobotrys (βότρυς, ὁ, bunch of grapes)
Rhyncholopha = Rhyncholophus (λόφος, ὁ, crest)
Sciuris = Sciurus (σκιόνυρος, ὁ, shadow-tail, squirrel)
Sclerostomum = Sclerostoma (στόμα, τό, mouth)
Scotophylla = Scotophyllum (φύλλον, τό, leaf)
Therofon = Therophonum (θηροφών, ὁ, killing wild beasts)
Xylostyla = Xylostylus (στύλος, ὁ, pillar)
Zygopeltis = Zygopelte (πέλτη, ἦ, shield)

A consideration of duplicates arising out of the above cases, or from alternative words, will be found in section IV.
Terms are invalid unless properly transliterated; retroactively, all improper transliterations are to be corrected.

"Nomina generica Graeca Latinis literis pingenda sunt." Critica Botanica 127.

"The strict Latin orthography can not be too rigorously insisted upon; consistency will in no other way be attainable." Miller, Scientific Names 127.

The following table shows the proper transliteration of Greek vowels, diphthongs, and consonants into Latin. For the sake of uniformity, alternative transliterations (such as a for η final, e for α), are avoided.

\[
\begin{array}{llll}
\alpha &= a & \alpha &= ae \\
\epsilon &= e & \epsilon &= au \\
\eta &= e & \eta &= i \\
\iota &= i & \iota &= eu \\
\omicron &= o & \omicron &= u \\
\nu &= v & \nu &= u \\
\omicron &= o & \omicron &= yi \\
\alpha &= a & \alpha &= m \\
\epsilon &= e & \epsilon &= n \\
\omicron &= o & \omicron &= m, \text{ in final -ov} \\
\beta &= b & \beta &= t \\
\gamma &= g & \gamma &= n \\
\delta &= d & \delta &= d [\gamma, \chi] \\
\zeta &= z & \zeta &= ps \\
\theta &= \theta & \theta &= th \\
\kappa &= k & \kappa &= nc \\
\lambda &= \lambda & \lambda &= l \\
\mu &= m & \mu &= m \\
\nu &= n & \nu &= n \\
\xi &= \chi & \xi &= nch \\
\omicron &= \omicron & \omicron &= rh, \omicron \omicron = rrh \\
\sigma, \varsigma &= s & \sigma, \varsigma &= h \\
\end{array}
\]

Medial ' (h) arising from word-formation is to be transliterated, thus preventing elision of a preceding vowel, unless its presence is already shown by aspirating the preceding consonant, as in ἐφιπερα. Latin usage is variable in this particular, since words already compounded in Greek, in which the aspirate was not visible, were transliterated into Latin as they stood, while in other words in which the presence of the aspirate was felt or known, the latter was transliterated. In scientific words it is important that the rough breathing be rendered by h, not only in order that the terms of a compound may be readily recog-
nized, but also to avoid the possible confusion of two compounds otherwise exactly alike.¹

The following list will serve to illustrate the more frequent errors in transliteration, and their correction.

Adenocaulon = Adenocaulum (or, much better, Adenocaulus, the last term being καυλός, ὁ, stalk); Lachnocaulem
Agropyron = Agropyrum (πυρός, ὁ, wheat)
Aerophytum = Aerophyton (φυτόν, τό, plant); Petrophytum
Amelodesmos = Amelodesmus (δεσμάς, ὁ, band)
Amphicarpon = Amphicarpum (better, Amphicarpus from καρπός, ὁ, fruit)
Acrospeira = Acrospira (σπείρα, ἡ, knot, coil)
Amorpha = Amorphe (μορφή, ἡ, form)
Arachnion = Arachnium (ἀράχνιον, τό, spider’s web)
Apios = Apius (ἄπιος, ἡ, pear, pear-tree)
Aplopappus = Haplopappus (ἀπλός, simple)
Arctostaphylos = Arctostaphylus (better, Arctostaphyle from ἵφυς, ἡ, bunch of grapes)
Astrebla = Astreble (στρέβλη, ἡ, roller, στρεβλός, ὁ, ὅν, twisted)
Batodendron = Batodendrum (βατόν, τό, tree); Linodendrum, Phorodendrum, Toxicodendrum
Blepharoneuron = Blepharoneurum (νεφρόν, τό, fibre, nerve)
Brachychaeta = Brachychaete (βραχύ, ἡ, hair)
Callirhoe = Callirrhoe; Glycyrrhiza, Coralliorrhiza, etc.
Chaetochloa = Chaetochloe (χατός, ἡ, grass); Echinochloe, Ericchiole, Helochloe, Leptochole, Scolochloe
Chamaecladon = Chamaecladus (κλάδος, ὁ, shoot)
Chamaenerion = Chamaenerium (χάμα, τό, oleander)
Chamaerhodos = Chamaerhodus (better Chamaerhodum, βίδον, τό, rose)
Chionyne = Chionohyphe (ὑφή, ἡ, web)
Cheiranthes = Chiranthus (χείρ, ἡ, hand); Chiromyces
Coilomyces = Coelomyces (κοῖλος, hollow)

¹Linné. Critica Botanica, 129. 1737.
Dall, W. H. Nomenclature in Zoology and Botany, 55. 1877.
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Cyperus = Cypirus (κύπειρος, δ, marsh plant)
Corypha = Coryphe (κορυφή, ἡ, head, top)
Dasylirion = Dasylirium (λείριον, τό, lily)
Diospyros = Diopyrus (πυρός, δ, wheat)
Dolichos = Dolichus (δολιχός, long)
Eleocharis = Helocharis (ἐλος, τό, marsh)
Elodea = Helodes (ἐλώδης, marshy)
Gyrotheca = Gyrothece (θῆκη, ἡ, box); Heterothece, Tetragonothecae
Haplymenium = Haplohymenium (ὑμέινον, τό, little membrane)
Helicoon = Helicoum (ὁφών, τό, egg)
Hemicarpha = Hemicarpe (κάρφη, ἡ, scale, better Hemicarphus, κάρφος, τό, scale)
Hydrocleis = Hydroclis (κλείς, ἡ, hook, key)
Hydrodictyon = Hydrodictyum (δίκτυον, τό, net)
Korycarpus = Corythocarpus (κόρυσ, κόρυθος, ἡ, helmet)
Lecanidion = Lecanidium (λεκανίδιον, τό, dish, pan)
Lycopersicon = Lycopersicum (περικύκλον, τό, peach)
Metroxylon = Metroxylum (μέτρον, τό, wood); Stereoxylum
Microthyrion = Microthyrium (θύριον, τό, little door)
Opegrapha = Opographe (ὑγραφή, ἡ, drawing)
Orophaca = Orophace (φακὴ, ἡ, lentil)
Potamageton = Potamogiton (γαῖτων, δ, neighbor)
Protalos = Protohalus (ἄλος, ἄλος, ἡ, sea)
Prinos = Prinus (πρῖνος, ἡ, evergreen oak)
Rhodospatha = Rhodospathe (ῥόδαθη, ἡ, broad blade)
Sicyos = Sicyus (σίκυος, ὀ, common cucumber)
Spirodele = Spirodele (δῆλος, visible)
Steirochaete = Steirochaete (στείρα, ἡ, beam of a keel); Stironema
Stenospermion = Stenospermatum (στενός, τό, little seed)
Symphoricarpos = Symphoricarpus (καρπός, δ, fruit)
Symplocos = Symplcos (σύμπλοκος, entwined)
Syndesmion = Syndesmion (better, Syndesmus, σύνδεσμος, δ. band)
IV

Of two or more similar terms, the earliest alone is valid, unless they show an essential difference in root, suffix, or prefix; differences of spelling, gender, or alternative termination are insufficient. Retroactively, the earliest name, if not already in the proper form, is to be corrected, while all others fail.

“Nomina generica, simili sono exeuntia, ansam praebent confusionis.” Critica Botanica 43.

“Nomina generica ex aliis nominibus genericis, cum syllaba quadam in fine addita, conflata, non placent.” Ibid. 38.

Similar generic names have long constituted a grave source of confusion in biology. Nearly every writer upon botanical nomenclature has appreciated this fact, and has suggested some method of obviating the difficulty. Linné¹ pointed out clearly the way by which all such duplicates and apparent duplicates might be avoided, but in the subsequent rapid development of taxonomy his precepts were lost sight of or ignored. The Paris Code, though silent on this matter, unintentionally aggravated the situation by the unfortunate reservations of Article 66. In passing, it should be noted how signally the purpose of this scholarly article has been defeated by the presence of an unimportant exception. The provision that “every botanist is authorized to rectify the faulty names or terminations, unless it be a question of a very ancient name current under its incorrect form,” obviously made exception only for names given by Aristotle, Theophrastus, Dioscorides, Pliny, and other Greek and Roman writers upon plants. But this exception has since been persistently misunderstood, or purposely extended to cover any incorrect name of any degree of currency whatsoever, and has finally found expression in the absurd dictum that “the original form of a name is to be retained no matter how incorrect it may be.” This feeling seems to have had some influence upon the treatment of similar generic names in the Berlin Rules and in the Rochester Code. Though the statement of the rule is different, the treatment is practically identical in both. According

¹Critica Botanica, 39, 43.
to the former, "similar names are to be conserved, if they differ ever so little in the last syllable; if they only differ in the mode of spelling, the newer one must fall." Also, "there are to be conserved Adenia as well as Adenium, Apios as well as Apium, Chloris as well as Chlorea and Chlora, Danae as well as Danais, Hydrothrix as well as Hydrotriche, Silva as well as Silvia, etc.; we doubt that there is any scholar who will confound them. On the contrary, Tetraclis and Tetracleis, Oxythce and Oxythcca, Epidendrum and Epidendron, Oxyccus and Oxyccos, Asterocarpus and Astrocarpus, Peltostema and Peltistema are only different modes of spelling the same word, and the newer one is to be rejected if they name different genera." The Rochester Rules provide that "Similar generic names are not to be rejected on account of slight differences, except in the spelling of the same word; for example, Apios and Apium are to be retained, but of Epidendrum and Epidendron, Asterocarpus and Astrocarpus, the latter is to be rejected." In both codes, it will be noticed that similar names are to be rejected only when the difference is merely one of transliteration of the ending, or, very rarely, of connective. A difference of gender termination or of alternative ending is considered sufficient to warrant retention, even though this difference results from incorrect formation, as in Hydrotriche.

Both rules are equally far from any classical warrant, and, in consequence, neither code can furnish a logical or accurate basis for the treatment of similar terms. In formulating a rule for these, however, it is impossible to give serious consideration to the views of mere logophiles, who would make wholesale rejections on the basis of slight or fancied similarities. Thus, it has been suggested that Micranthus and Micranthemum are so similar as to warrant the rejection of one, while of Macranthe and Megalanthe, Glycyphila and Glycyphylla, one should be rejected because the first two are practically identical in meaning, and the last two in pronunciation! Between the two extremes there

1 Vorschläge zur Ergänzung der "Lois de la Nomenclature Botanique." Berlin, 1892.
is but one logical position, namely, similar terms are identical in nomenclature when as Greek and Latin words they exhibit no essential differences. Thus, Cerastium, Ceratium, and Ceratia are merely different forms of a Greek word κεφαλή, and are homonyms, while Lecane, Lecanarium, and Lecanidium are different words, the last two being formed upon the first by the use of suffixes. Frequent affixation of the same stem should be carefully avoided, however, regardless of the validity of the resulting derivatives.

Such Greek words as ἄνθος, γράφις, κεφαλή, and their relatives, which are extremely frequent in nomenclature, will serve very well to show the difference between homonyms and similar yet valid terms. Besides many compounds, the lexicon shows twenty derivatives of the root ἄνθ-: of these, the following seventeen are sufficiently distinct to justify their use: ἄνθος, τό, flower; ἄνθηλη, η, panicle; ἄνθεμον, τό, flower; ἄνθεμιον, τό, floweret; ἄνθιον, τό, floweret; ἄνθεμικος, ὁ, flower of asphodel; ἄνθειών (ἄνθων), ὁ, flower bed; ἄνθεμώδης, flower-like; ἄνθεμεις, flowery; ἄνθεμοστός, adorned with flowers; ἄνθηδον, η, bee; ἄνθηρις, flowery; ἄνθηρτης, η, bloom; ἄνθηρις, η, full bloom; ἄνθητικός, blossoming; ἄνθωνος, blooming; ἄνθοσώμη, η, bloom. ἄνθη, η, full bloom, flower, should be avoided in composition, since it is identical with ἄνθος when used as a first term, and is confusing as a last term; ἄνθειόν is identical with ἄνθιον, and ἄνθεμίς too near ἄνθεμον to be fortunate. The root γράφ- shows two series of derivatives, one based upon the root, and the other upon the stem γραμματ-.. Of the latter, γράμμα, τό, letter, picture, γραμματείδον, τό, document, γραμματείδιον, τό, small tablets, γραμματεῖς, ὁ, scribe, and γραμματική, η, written character, are different, while γραμμή, η, stroke, line, is to be regarded as a mere alternative of γράμμα. In the first series, γραφή, η, drawing, γραφείον, τό, pencil, γραφείδιον, τό, pencil, and γραφικός, graphic, are distinct, but γραφίς, η, stylus, and γράφος, τό, letter, are alternatives. Of the derivatives of κεφαλή, η, head, κεφαλίς, η, little head, should be avoided, but the following are distinct; κεφάλιον, τό, little head; κεφαλίδιον, τό, little head; κεφαλίνη, η, head of the tongue; κεφαλικός, of the head; κεφαλάιος, of the head; κεφαλαιώδης, chief. Nomenclature would, however, become very much involved for anyone but the philologist, if all
the proper derivatives of such roots as the above were to find a place in it. Such a condition can be readily avoided if proposers of terms will take the trouble to acquire a Greek vocabulary.

I. Homonymns.

These arise from alternative forms of the same root or stem, from mere differences of spelling, transliteration, gender or alternative ending, or from differences produced by erroneous connectives or terminations.

Aceras Pers. 1807
Acerates Elliott 1817
Aceratium DC. 1824
Aceratia F. Müll. 1854
Acetabulum Tourn. 1700
Acetabula Fries 1822
Acetabularia Lamx. 1816
Acetubilarium Endl. 1836
Achlys DC. 1821
Achlya Nees 1823
Adenia Forsk. 1775
Adenium Roem. & Schult. 1819
Adenogyne Klotzsch 1841
Adenogynum Rchb. & Zoll. 1856
Adenophorus Desvaux 1808
Adenophora Fisch. 1823
Apios Boerh. 1720
Apium Hoffm. 1814
Calanthe R. Br. 1821 (mel. Calanthis)
Kalosanthes Haworth 1821
Calanthea DC. 1824
Calosanthes Blume 1826
Callitriche L. 1751 (cor. Callithrix)
Calythrix R. Br. 1819
Calotrich Ag. 1824
Cerastium L. 1737 (cor. Ceratium)
Ceratia Adans. 1763
Ceratium Alb. & Schwein. 1805
Chamaedrys Tourn. 1700
Chamaedryon Seringe 1825
Chamaemelum Tourn. 1700
Chamaemeles Lindl. 1822
Chamaemela DC. 1837
Chlora Adans. 1763
Chloraea Lindl. 1826
Chlorea Nyland. 1854
Coleosanthis Cassini 1817 (cor. Coleanthus)
Coleanthus Seidl 1817
Dasanthera Raf. 1819 (cor. Dasyanthera)
Dasianthera Presl 1831
Dermatocarpon Eschw. 1824 (cor. Dermatocarpum)
Dermatocarpus Miers 1852
Dermocarpa Crouan 1856
Desmanthus Willd. 1805
Desmosanthes Blume 1825
Dicera Forst. 1776 (cor. Diceras)
<table>
<thead>
<tr>
<th>Greek and Latin in Biological Nomenclature</th>
<th>65</th>
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<tbody>
<tr>
<td>Diceras Endl. 1840</td>
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<td>Dictyanthes Rchb. 1837 (mel. Dictyanthus)</td>
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<td>Dictyanthus Decaisne 1844</td>
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<td>Drimys Forst. 1776</td>
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<td>Drimia Jacq. 1786</td>
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<td>Epiphegus Spreng. 1820</td>
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<td>Epiphagus Rylands 1843</td>
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<td>Eremanthus Cassini 1827 (cor. Eremanthus)</td>
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<td>Eremanthus Lessing 1829</td>
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<td>Eremanthe Spach 1836</td>
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<td>Erythranthus Hanstein 1853</td>
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<td>Erythranthe Baillon 1858</td>
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<td>Eurotia Adans. 1763</td>
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<td>Eurotium Link 1809</td>
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<td>Gamochilum Walpers 1839</td>
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<td>Gamochilus Lestib. 1841</td>
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<td>Glycyphylla Raf. 1819 (cor. Glycyphylla)</td>
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<td>Glycypylla Steve n 1834</td>
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<td>Glyphia Cassini 1818</td>
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<td>Glyphaea Hook. f. 1846</td>
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<td>Gonatob/trys Corda 1839</td>
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<td>Gonatobotryum Sacc. 1879</td>
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<td>Gonyanthes Blume 1823 (cor. Gonathanthus)</td>
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<td>Gonatanthus Klotzsch 1840</td>
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<td>Grammocarpus Ser. 1825 (cor. Grammatocarpus)</td>
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<td>Grammatocarpus Presl 1831</td>
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<td>Heterocladia Decaisne 1841</td>
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<td>Heterocladium Schimp. 1852</td>
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<td>Hippobroma G. Don 1834</td>
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<td>Hippobromus Eck. &amp; Zeyh. 1836</td>
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<td>Holophyllum Lessing 1830</td>
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<td>Holophylla G. Don 1837</td>
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<td>Isomerium R. Br. 1830</td>
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<td>Isomeria Presl 1837</td>
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<td>Lecanium Presl 1843</td>
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<td>Lecania Massalongo 1853</td>
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<td>Lepidocarpus Adans. 1763</td>
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<td>Lepidocarpa Blume 1855</td>
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<td>Lepidota Sterb. 1820</td>
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<td>Lepidotus Fries 1836</td>
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<td>Lepidotia Rchb. 1841</td>
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<td>Lepidotum Dunal 1852</td>
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<td>Lepisanthus Blume 1825 (cor. Lepidanthus)</td>
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<td>Lepidanthus Nees 1830</td>
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<td>Macranthus Poir. 1813</td>
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<td>Macranthea Boiss. 1840</td>
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<td>Macrantha Bunge 1843</td>
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<td>Macropodium R. Br. 1812</td>
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<td>Macropodia Fuckel 1869</td>
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<td>Marainophyllum Pohl. 1825 (cor. Marantophyllum)</td>
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<td>Marantophyllum Michel 1855</td>
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<td>Megalanthe Gaudin 1828 (mel. Megalanthus)</td>
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<td>Megasanthus G. Don 1834</td>
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<td>Microglossa DC. 1836</td>
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<td>Microglossum Sacc. 1884</td>
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<td>Microtea Swartz 1788 (mel. Microtes)</td>
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<td>Microtis R. Br. 1810</td>
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<td>Monochila G. Don 1834 (cor. Monochilus)</td>
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<td>Monochilus Fisch. &amp; Meyer 1835</td>
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II. Terms classically different, but so similar in form as to be unfortunate. There is not sufficient warrant for the rejection of these, but their formation is to be avoided, if not, indeed, invalidated, for the future.

Acarphaea Harvey & Gr. 1849
Acarpha Griseb. 1856
Chlora Adans. 1763
Chloris Swartz 1788
Danae Medic. 1787
Danais Vent. 1799
Galax L. 1753
Galactia P. Br. 1756

Sphaerophorus Pers. 1794
Sphaerophora Blume 1850
Sphaeroplea Ag. 1824 (cor. Sphaeropleum)
Sphaeropleum Link 1826
Stilbe Berg. 1767
Stilbum Tode 1790
Tapinanthus Blume 1824
Tapeinanthus Herbert 1837
Tetrandra A. DC. 1845 (cor. Tetrane)
Tessarandra Lindl. 1847
Thrixspermum Lour. 1790
(cor. Trichosperma)
Trichospermum Blume 1825
Trachysperma Raf. 1809
Trachyspermum Link 1821
Trichopterus Neck. 1790
Trichipterus Presl 1822
Trichosanthus L. 1737 (cor. Trichanthus)
Trichantha Hook. 1844
Trichanthus Philippi 1857
Xanthoglossa DC. 1837
Xanthoglossum Lindl. 1852
Greek and Latin in Biological Nomenclature

Philydrum Gaertn. 1788 (mel. Philohydrum)
Isomerium R. Br. 1830
Isomeris Torr. & Gr. 1838
Ixianthes Benth. 1836 (mel. Ixianthus)
Ixanthus Griseb. 1839
Lepanthes Swartz 1799 (mel. Lepanthus)
Lepisanthus Blume 1825 (cor. Lepidanthus)

III. Similar terms distinct classically and nomenclaturally
Actinostemon Klotzsch 1841
Actinostemma Lindl. 1847
Aelectra Thunb. 1784
Alectryon Gaertn. 1788
Brachylobos DC. 1821 (cor. Brachylobus)
Brachylobium C.A. Meyer 1841
Calopogon R. Br. 1813
Calopogonium Desvaux 1826
Ceramianthemum Donati 1750
Ceramianthe Rchb. 1831 (mel. Ceramianthus)
Cladodes Lour, 1790
Cladodium Bridel 1826
Diceratum Lagasca 1815

Rhaphidospora Nees 1832
Rhaphiospora Körb. 1855
Syncephalum DC. 1837
Syncephalis Van Tieghem 1875
Theriophonum Blume 1835
Therofon Raf. 1836 (cor. Therophonum)
Xanthopsis DC. 1836
Xanthopsis DC. 1837

Terms are invalid unless properly spelled; retroactively, improper spellings are to be corrected.

Apart from its application to improper formations, this thesis is of secondary importance. It is given place here merely to emphasize again the fact that nomenclature in all its aspects must rest upon a classical basis, a repetition rendered imperative for the reason that many biologists and more than one code still re-
gard the Latin of Linné as the model. In Greek, a large number of incorrect spellings have arisen from the careless practice of dropping one or more letters at the end of a word, or from the arbitrary change of the termination. The names of Theophrastus and Dioscorides, especially, have suffered mutilation, and should be restored to the original form, while the correction of later misspellings should be made upon the basis of the classical form of the terms of the compound. In the rare cases in which the spelling of a Greek word has been changed in Latin, the Greek form should prevail.

VI

Terms are invalid if they exceed six syllables in length; retroactively, the correction of sesquipedalian words must never take place by contraction or mutilation.

"Nomina Generica Sesquipedalia, enunciatu difficilia, vel nauseosa, fugienda sunt." Critica Botanica 133.

The practice of biologists with respect to the formation of extremely long terms has been so exemplary that the present rule scarcely requires postulation. Its justification may be found in the fact that inconveniently long words, more or less frequent a century ago, still appear occasionally, and that such words, if there were no definite sentiment or legislation against them, might again become frequent as the supply of primitives and short compounds becomes exhausted. It is more or less unsatisfactory to limit the length of a word by the number of syllables, since these vary greatly in length in different stems, but this is undoubtedly better than limitation by the number of letters. It is a question whether nomenclature would not gain more than it would lose, if the maximum length of words were placed at five syllables, though the number of changes necessitated would probably render such a rule inacceptable. Naturally, the present rule should not be made operative in the case of names of groups above the genus.
Hybrid terms are invalid: retroactively, Greek-Latin hybrids are to be corrected upon the basis of the Greek element, but all vernacular and personal hybrids fall.

"Nomina generica ex vocabulo græco & latino, similibusque, Hybrida, non agnoscenda sunt." Critica Botanica 28.

"Everyone is bound to reject a name in the following cases:
... (4) When it is formed by the combination of two languages." Paris Code, Article 60. 1867.

"The possibilities of the field he has opened up for us are indeed great, witness: Smithia, Smithago, Johnsmithotoma, Igsmithia, Smithalga, Smithodendron. I dwell on this because it seems to me that botanical Latin is impure enough already without such gratuitous monstrosities." Pound. American Naturalist, 26:147. 1892.

"An unhappy feature of Dr. Kuntze's work, and one in vindication of which I can say nothing, is his method of constructing new names for genera. Perhaps in some distant century, when self-repeating history may have brought the return of times when scientists were mostly men of clear ethics, solid learning, and refined tastes, some such reform in plant nomenclature as that which M. Saint-Lager in these times vainly advocates will be carried into effect. If, before the advent of that good time, Dr. Kuntze's Radlkofertoma and Schweinfurthafra shall have become current for certain genera, they will be the first to be rejected." Greene. Pittonia, 2:277. 1892.

The indifference of many biologists to a classical standard for nomenclature reaches its logical culmination in the formation of hybrid words. Botanists especially are practically unanimous in condemning hybrids, but, in spite of this fact, carelessness and ignorance are steadily increasing the number of illegitimate words. It is unnecessary to prove that hybrids are as unfortunate in nomenclature as in philology, but it is necessary that particular attention be given to them in order that they may be avoided, or at least corrected. No biologist of any real attain-
ment can afford to stand sponsor for a hybrid name, when a trifling expenditure of time will yield a word of pure birth.

For the sake of clearness, hybrids may be divided into two classes: (1) Greek-Latin hybrids, in which one element is Greek and the other Latin; (2) vernacular hybrids, in which one element is from a modern tongue, while the other is classical, usually Latin. Each class shows hybrids in which both terms are independent words, and those in which one term is an affix. There is no essential difference between these as hybrids, but the distinction is an important one, because words of the second group are rarely recognized as hybrids on account of the slight familiarity of biologists with classical methods of derivation. The matter presents indeed some difficulty for the philologist, because of the similarity of cognate affixes in Greek and Latin, and because of Greek affixes borrowed by Latin. On account of the difficulty of detecting them, hybrids of this sort are becoming more and more common. The raising of hybrid sectional names in ev-, ϕευδο-, -ωδης, -ella, -astrum, etc., to the rank of generic names is contributing very largely to this result, as also the endeavor to honor a biologist by attaching all the Latin suffixes in turn to his name.

There has been considerable discussion regarding the treatment of such hybrids as pseudorepens and Eucarex. The contention is made that these words are not hybrids, since these affixes were regularly used by Latin writers, but, as a matter of fact, they are not found in classical Latin outside of borrowed Greek words in which they are a proper affix. It has further been urged that such words are scarcely hybrids, for the reason that pseudorepens does not mean "false creeping," but merely refers to a species of Agropyrum, which is not A. repens. Such argument is mere sophistry, since every compound or derivative which contains a Greek and Latin element, whether independent word or affix, is a hybrid. The only possible exception is found in those rare Greek words which have become so completely domiciled in Latin that their origin is no longer felt.

The correction of hybrids\footnote{Since the above was written, three instances of a similar correction of} is possible only when the word
arises from the combination of Greek and Latin forms, in which case the cognate or corresponding Greek form is used to replace the Latin element. In the case of vernacular hybrids, such substitution is so rarely possible that it may be entirely disregarded, and all vernacular hybrids, the majority of which are personals, are to be summarily rejected. Such names fall not only because they are hybrids, but also on account of the operation of rules I and VIII. Greek-Latin hybrids, which are current in nomenclature, are to be corrected and followed by double citation of author and reviser, but hybrids proposed in the future, being invalid under the present rule, may be corrected or ignored at the will of the reviser, who alone is to be cited for the new name in either event.

The following list will illustrate the various kinds of hybrids, as well as the method of correction, when this is possible.

I. Greek-Latin hybrids in which both terms are independent words.

Actiniceps = Actinocybe (άκτις, άκτινος, ἤ, ray, κόβη, ἤ, head)
Aureobasidium = Chrysobasidium (χρυσόεσ, golden, βασίδιον, τό, pedicel)
Baculospora = Bactrospora (βάκτρον, τό, staff, σπορά, ἤ, seed)
Botrypes = Botryopus (βότρυς, ὁ, cluster of grapes, πούς, ποδός, ὁ, foot)
Callosisperma = Sclematosperma (σκλήρμα, σκλήματος, τό, hardness, σπέρμα, τό, seed)
Claudopus = Loxopus (λοξός, slanting, crooked, πούς, ὁ, foot)
Clavogaster = Rhopalogaster (ῥόπαλον, τό, club, γαστήρ, ἤ, belly)
Clypeosphaeria = Peltosphaeria (πέλτη, ἤ, small shield, σφαῖρα, ἤ, ball)
Fagopyrum = Phegopyrus (φηγός, ἤ, oak, πυρός, ὁ, wheat)
Fimbristylis = Lomatostylis (λύμα, λύματος, τό, fringe, στυλός, ἤ, pillar)
Fusicolla = Chytocolla, (χυτίς, poured out, κόλλα, ἤ, glue)
Geminispora = Dissospora (δίσσος, double, σπορά, ἤ, seed)

Hybrids have been found in Pfeiffer's Nomenclator Botanicus 1:624, 1050, 1640. Catasetum Kunth is corrected to Catachaetum, Diastemella Oersted to Diasteination, and Loroglossum Rich. to Himantoglossum.
Frederic E. Clements

Gorgoniceps = Gorgocybe (Γοργώ, ὥς, ή, the Gorgon, κόβη, ή, head)
Hemicarex = Hemidonax (ἡμ-, half, δώνας, ὅ, reed)
Massospora = Mazospora (μάζα, ἡ, barley cake, σπόρα, ἡ, seed)
Muciporus = Myxoporus (μῦζα, ἡ, mucus, πώρος, ὃ, pore)
Nemacola = Nemocolus (νέμος, τό, wooded pasture, -κολός, dwelling)
Nitophyllum = Phaedrophyllum (φαιδρός, bright, φύλλον, τό, leaf)
Nothofagus = Nothophegus (νόθος, spurious, φηγός, ἡ, oak)
Nucleophagus = Caryophagus (κάρυνος, τό, nut, φάγος, eating)
Onychosepalum = Onychocalyx (ὀνυξ, ὄνυχος, ὃ, claw, κάλυξ, τ', cup of a flower)
Pachyfissidens = Pachyschizodon (παχύς, thick, σχίζοιδων, ὃ, split tooth)
Peltigera = Peltophora (πέλτη, ἡ, shield, φορά, ἡ, a carrying)
Phaioclavulina = Phaeocoryne (φαιός, dusky, κορώνη, ἡ, club)
Pseudopeziza = Pseudopezis (ψευδής, false, πέτις, ἡ, stalkless fungus)
Radulotypus = Psectrotypus (ψηκτρα, ἡ, scraper, τύπος, ὃ, form)
Retiporus = Dictyoporus (δικτυων, τό, net, πόρος, ὃ, pore)
Scirpodendron = Donacodendrum (δόναξ, δόνακος, ὃ, reed, δένδρον, τό, tree)
Septosporium = Schizosporium (σχίζως, ἡ, cleft, σπόριον, τό, spore)
Verticicladium = Helicocladium (ἐλεξ, ἐλικός, ἦ, whirl, κλαδίων, τό, branch)

II. Greek-Latin hybrids in which one term is an affix.
Anthostomella = Anthostomatum
Bisporella = Disporyllium
Brizula = Brizyllium
Chlorosa = Chlorotes
Coryneliella = Corynisce
Cyphella = Cypharium
Dolicholus = Dolichidium

Eucaprifolium = Euaegophyllum (αιξ, αἰγός, ὃ, goat, φύλλον, τό, leaf)
Eucarduus = Euacantha (ἄκανθα, ἦ, thistle)
Fusidium = Atractidium (ἄτρακτος, ἦ, spindle)
Gaurella = Gauryllium
Glossula = Glossidium
Graphiola = Micrographium (cfr. Graphis, Graphium, Graphidium, Graphyllium)
Hormiactella = Hormiactinium (ἄρμα, ἦ, fishline, ἀκτής, ἀκτίνος, ἦ, ray)
Hypocrella = Hypocreatium
Illicioides = Dryodes (δρῶς, δρυός, ἦ, oak)
Juncodes = Thryodes (θρῦόν, τό, rush)
Labridium = Chilidium (χείλος, τό, lip)
Lachnella = Lachnium
Lachnellula = Microlachnium
Lithophragmella = Lithophragmatium
Lophiola = Microlophium
Myriactula = Myriactinium
Nasturtioides = Napyodes (νάπυ, τό, mustard)
Phaeodiscula = Phaeodiscium
Pholiotella = Pholidotium (φολιδωτός, clad with horny scales)
Polystomella = Polystomatium
Pterula = Pteridium
Rhodiola = Rhodarium
Sphaerosporula = Sphaerosporyllium
Stigmatella = Stigmatium
Struthiola = Struthidium
Tiarella = Tiaryllium
Trichopeltulum = Trichopeltium
Typhula = Typhidium
Zomicarpella = Zomatocarpium (ξώμα, ξώματος, τό, girded doublet)

III. Vernacular-classic hybrids in which one term is a personal name.

Hybrids of this class lack even the excuse of ignorance. Nomenclature can show but one greater monstrosity, namely, the mutilated vernacular compound. Such personals can not be corrected and must fall ir-
revocably. Kuntze has been censured unjustly as the originator of the personal hybrid, since the latter was already found in numerous examples, as he himself has shown. But he deserves to be severely censured for greatly extending its use. Such atrocities as Pseudoleskesia, Microschwenkia, Gerrardanthus, Pringleophyllum, etc., were in existence before the Revisio, but they are lost sight of in the deluge of such foundlings proposed in the latter. The magnitude of Kuntze's offense against a classical nomenclature may be seen from the fact that out of 109 generic names proposed by him, 67 are personal hybrids, and the remainder are almost entirely mutilations, such as Watsonamra, Clarkeinda, Schweinfurthafra, Itoasia, etc. In the first volume of the Revisio, the author gives a variety of methods by which the same botanist may be "honored" ad nauseam without increasing homonymy. The whole treatment manifests not only an entire absence of linguistic taste, but also an abiding ignorance of classical philology. Kuntze, elsewhere says apologetically, "Ich bin im Griechischen wenig erfahren." It is to be regretted that this feeling did not restrain him from such monstrous treatment of classical stems.

The following lists, though by no means complete, will serve to illustrate the various kinds of vernacular hybrids, all of which are to be rejected.

1. Vernacular-Greek hybrids—personals.

<table>
<thead>
<tr>
<th>Greek Hybrid</th>
<th>Vernacular Hybrid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bakeropteris</td>
<td>Beccariodendron</td>
</tr>
<tr>
<td>Balfourodendrum</td>
<td>Beckeropsis</td>
</tr>
<tr>
<td>Barleriacanthus</td>
<td>Benthamidium</td>
</tr>
<tr>
<td>Barlerianthus</td>
<td>Blumeodendrum</td>
</tr>
<tr>
<td>Barleriopsis</td>
<td>Buforrestia</td>
</tr>
<tr>
<td>Barleriosiphon</td>
<td>Caloknightia</td>
</tr>
<tr>
<td>Barleriotes</td>
<td>Chamaesaracha</td>
</tr>
<tr>
<td>Beccarianthus</td>
<td>Chamissomniea</td>
</tr>
</tbody>
</table>

2. Ibid., 3:214. 1893.
Christiastrum
Cordierites
Cyphokentia
Diserneston
Doellochloa
Doniophytum
Dyerophytum
Ellisiophyllum
Englerophoenix
Epizeimeria
Epibrissonia
Eugeniastrum
Eugenioides
Fritschiantha
Gayophytum
Gerrardanthus
Glaziostelma
Grayemma
Hackelochloa
Halterophora
Harveyastrum
Henningsoscarpun
Henningsomyces
Huegeliroea
Kentiopsis
Kuhniastera
Kuntzeomyces
Leiocclusia
Lenzites
Ludwigiantha
Lyonothamnus
Macounastrum
Macowanites
Mannoglottis
Marilaunidium
Melioschinzia
Microkentia
Microschwenkia
Microweissnia
Montagnites
Neobrunia
Neocontarinia
Neograyia
Neohuttonia
Neopeckia
Neoskofitzia
Neowashingtonia
Nesogordonia
Oliverodoxa
Orchidofunkia
Osbeckiastrum
Palaeogrewia
Parabesleria
Parabouchetia
Parapottisia
Phaenohoffmannia
Pleomassaria
Porteranthus
Preussiaster
Pringleophytum
Prockiopsis
Protohopea
Protoventuria
Pseudehretia
Pseudobarleria
Pseudogunnera
Pucciniopsis
Pycnoseynesia
Radlkofertoma
Rhabdoweissia
Roeperocharis
Sarcolippia
Schmitzomia
Schroeteriaster
Frederic E. Clements

Sibbaldiopsis
Silvianthus
Siphoneugenia
Smithantha
Stahlianthus
Stanhopeastrum
Sternohopeastrum
Thalianthus


Absolmsia
Agardhina
Algogrunowia
Algorichtera
Arcangelina
Balfourina
Bartramidula
Baumanniiella
Beccariella
Benthamistella
Berkeleyana
Bisboeckelera
Brocchinia
Caruelina
Cohnidonum
Cookeina
Crepinula
Delpinoina
Detonina
Dillwynella
Drudeola
Eremicella
Errerana
Fabreola
Flueckigera
Forsteronia
Freyella
Friesula

Thileodoxa
Thouanidium
Tulasnodea
Urbanodendrum
Uroskinnera
Weinmannodora
Wittmackanthus
Zieridium

Fuckelina
Gerrardina
Gibberinula
Greeneina
Grisebachiella
Harziella
Hemsleyana
Hendersonula
Hodgsoniola
Hofmeisterella
Hookerina
Hostana
Jacksonago
Julella
Karstenula
Kickxella
Koehneago
Knyaria
Kuetzinggingina
Latzinaea
Magnusina
Massariella
Massarina
Montagnula
Mohlana
Mortierella
Munkiella
Neilrichina
Nicholsoniella Scopulina
Nylanderaria Stephanina
Nymanina Thozetella
Octavianina Triumfettaria
Oliveriana Urbanisol
Oudemansiella Velloziella
Patouillardiella Vernonella
Peckiella Voglinoana
Peckifungus Warscewiczella
Penzigina Weddellina
Peyritschiella Wettsteiniella
Pfeifferago Wildpretina
Phillipimalva Wingina
Pringsheimina Winterella
Richterago Winterina
Saccardinula Zukalina
Saccardoella

IV. Vernacular-classic hybrids—impersonal.
Calamovilfa Sphaeropezia
Camphoromyrtus Tacsonia
Galedragon Talinastrum
Gelatinosporium Talinellum
Iguanura Tamarindus
Liquidambar Toluifera
Obaejacoides Vauanthes

VIII.

Vernacular names are invalid; this rule is retroactive.
“Nomina generica primitiva nemo sanus introducit.” Critica Botanica 22.
“Nomina generica, quae ex Graeca vel Latina lingua radicem non habent, rejicienda sunt.” Ibid. 48.
“Not to draw names from barbarous tongues, unless those names be frequently quoted in books of travel, and have an agreeable form that adapts itself readily to the Latin tongue, and to the tongues of civilized countries.” Paris Code, Article 28.
The vernacular name has long been the refuge of the unlettered or indifferent systematist, and will doubtless continue to be while there are biologists of this kind. The arguments against the use of vernacular terms are so obvious and cogent that they would not be dwelt upon were it not for the contradictory provisions of the Paris Code. As in so many other questions of nomenclature, Linné's pronouncement should have been regarded as final by the framer of the Code. But, as in more than one place, the Code admits a fatal exception. It is absurd to base biological nomenclature in any degree upon books of travel, and it is futile to think that an author who speaks any vernacular tongue whatever, no matter how crude and uncouth, would find it either harsh or disagreeable. Some biologists have endeavored to improve vernacular names by shortening them or by adding a Latin suffix, but such a remedy is worse than the original trouble. Correction by translation, as Chenan-thus for Gansblum, is occasionally possible, and in such cases might be more fortunate than the rejection of a name. The fundamental fact still remains, however, that nomenclature is already essentially classical, and should in the future be made completely so. Vernacular names have no place in it. This condition can be made to prevail only by rejecting all such names whether past or future.

Anagrams, if they be considered words at all, are vernacular, since they are neither Greek nor Latin. They are the ultimate product of puerility or illiteracy in nomenclature. Such a series as Filago, Gifola, Ifloga, Logfia, and Oglifa throws a clear light upon the good sense and linguistic taste of the authors concerned. One might better make names after the fashion of Carroll, or take names from the "hog-Latin" of childhood. All other mutilations, like anagrams, are unpardonable offenses against nomenclature, and are to be summarily rejected.

I. Anagrams.

<table>
<thead>
<tr>
<th>Alibum (Liabum)</th>
<th>Behuria (Hubera)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amida (Madia)</td>
<td>Beriesia (Siebera)</td>
</tr>
<tr>
<td>Anogra (Onagra)</td>
<td>Blitrydium (Tryblidium)</td>
</tr>
<tr>
<td>Baziasa (Sabazia)</td>
<td>Galpinsia (Salpingia)</td>
</tr>
</tbody>
</table>
Greek and Latin in Biological Nomenclature

Gandriloa (Oligandra)  Nepera (Spennera)
Gelfuga (Fluggea)    Norysca (Ascyron)
Gifola (Filago)      Obaejaca (Jacobaea)
Gosela (Selago)      Oglifa (Filago)
Ifloga (Filago)      Parosela (Psoralea)
Lagatea (Galatea)    Phledinium (Delphinium)
Lebidiera (Briedelia) Ranugia (Anguria)
Narthecium (Anthericum) Trelotra (Rottlera)
Neoceis (Senecio)    Trilisa (Liatris)

II. Vernacular mutilations.
  Andreoskia
  Beccarinda
  Berkleasmium
  Bolusafra
  Brittonamra
  Cavanilla
  Clarkeinda
  Cosimibuena
  Dickneckera
  Durandeeldea
  Elidurandia
  Fregirardia
  Gomortega
  Gonzalagunia
  Hallomuelleria
  Hasskarlinda
  Isidrogalvia
  Itoasia
  Kinginda
  Kurzamra
  Kurzinda
  Lippomuellera
  Maximowasia
  Meyerafra
  Muelleramra
  Razumovia
  Ridleyinda
  Schinzafra
  Sebschauera
  Schweinfurthafra
  Watsonamra

IX

A name is not valid unless its etymology and application are clearly indicated: this rule is not retroactive.

"Nomina generica, quae Characterem essentialem, vel faciem plantae exhibent, optimae sunt." Critica Botanica 97.
"Botanists who have generic names to publish show judgment and taste by attending to the following recommendations: . . . (2) To give the etymology of each name." Paris Code, Article 28.
The desirability of being able to know the etymology and application of each generic and specific name is obvious, but the rule given above will work advantageously in other matters also. An author who cites accurately the derivation of a proposed name will be much less apt to err in its construction, while the necessity for indicating its application will bring about greater accuracy in the choice of characters. Desirable as it might be, it is futile to demand that names show a proper degree of relevancy, or to reject them because they are more or less inapplicable. In matters of taste, it is both possible and highly desirable to have a standard, but it is idle to expect that it will be either appreciated or followed by the majority. Since names are to be rejected if improperly constructed, it is imperative that the exact etymology be given in each case, in order that their validity may be readily ascertained. A name then would stand or fall by its given etymology. It is extremely unsatisfactory to say of a name, for example, "from the Greek for flower;" the exact form of the Greek or Latin stem employed should be given.

X

The termination of family, ordinal, class, and branch names shall be uniform within each group: tribes shall terminate in -inae, families in -aceae, orders in -ales, classes in -eae, and branches in -phyta.

"The names of divisions and subdivisions, of classes and subclasses, are drawn from their principal characters. They are expressed by words of Greek and Latin origin, some similarity of form and termination being given to those that designate groups of the same nature." Paris Code, Article 18.

The designation of all groups of the same rank by means of a common suffix is at present merely a convenience, but with the increasing minuteness of systematic work and the growing tendency toward segregation, it will soon become a necessity. Subdivisions and superdivisions will need to be set off from tribes, families, orders, and classes, and the terminations for the latter must be definitely fixed in order to secure a basis for distinguishing the next
The number of possible divisions above the genus is fifteen, which makes it impossible that each should receive a distinct suffix. The most satisfactory method, then, will be to fix the designations for the five main groups, and to indicate sub and super divisions by prefixes, or by slight variations of the proper suffix. A further reason for this is found in the fact that cognate suffixes can alone be used, since generic names are either Greek or Latin, and that proper cognate suffixes are few. In fact, they are practically exhausted by the five principal groups, -alis, -ales, being, indeed, very hard to justify as a termination for Greek stems. It should be noted that -phyta is merely the neuter plural of the Greek word, φυτόν, τὸ, plant, and can be attached only to Greek stems.

The following examples will illustrate the operation of the above rule.

Protophyta: Schizophyceae: Nematogenales: Nostocaceae: Allosirinae
Phycophyta: Chlorophyceae: Conjugatales: Zygnemataceae: Mesocarpinae
Carpophyta: Ascomyceteae: Discomycetales: Pezizaceae: Sarco-scyphinae
Bryophyta: Hepaticae: Jungermanniales: Jungermanniaceae: Aploziinae
Pteridophyta: Filiceae: Filicales: Polypodiaceae: Onocleinae
Spermatophyta: Angiospermatae: Glumales: Graminaceae: Festucinae
In proposing generic names, the following rules are to be observed:

1. The name shall be a Greek substantive, i.e., not a simple adjective.

2. A single generic name may be founded upon the name of a botanist. Such names are only to be formed by adding -la to cognomina ending in a consonant and -a to cognomina in a vowel or -e, except in the case of names already Latinised, in which case the termination is first dropped.

3. Personal generic names shall be bestowed only in recognition of eminent services in botany.

4. Anagrams and geographical names are invalid.

5. Double generic names are invalid.

Generic names should in the future be formed exclusively from Greek, as simple Latin nouns suitable for plant names have been practically exhausted, and the formation of compound terms in Latin is awkward. Greek nominal stems of all sorts, simple or compound, with the exception of simple adjectives, such as μακρός, μέγας, etc., are readily available. The proposal of generic names in honor of rulers, patrons, collectors, friends, and relatives should be severely discountenanced. Furthermore, duplicates of the same personal, as Saccardaea, Saccardia, Pasaccardoa, Saccardoella, Saccardinula, and Beccaria, Beccariella, Beccarianthus, Beccardinda, and Beccariodendron must be regarded as invalid, because their terminations are no longer significant endings, but mere variations, and also because they are hybrids. Anagrams, as has been pointed out before, fall because they are vernacular, or mutilated, or both. Geographical names are almost invariably vernacular also. Double generic names, such as Dens-canis and Bursa-pastoris are compounded syntactically and are hence invalid, while others, such as Genisto-Spartium and Lilio-Nareissus are mere hybrids.
In proposing specific names, the following rules are to be observed:
(1) The name shall be a Greek or Latin adjective, referring to a character or function of the plant, or to its habitat.
(2) Reduplicative specific names are to be avoided.
(3) Comparatives, superlatives, and geographical adjectives are invalid; not retroactive.
(4) Personal adjectives and genitives are invalid; not retroactive.
(5) The specific name is invalid if the same as the generic name; retroactive.

None of the above rules are of primary importance, but their observance will materially improve the nomenclature of species. They represent the best usage at the present time, but need to be emphasized in order that they may be more generally followed. A specific name should not only mean something, but should also have a direct and evident application to some characteristic of the plant or habitat. In this connection, the necessity for the rules is obvious, though there will doubtless be dissent from the treatment of geographical and personal names. In support of the position taken on geographical names, it is sufficient to cite the names "canadensis," "carolinianus," "pennsylvanicus," "virginianus," etc., of Linnaeus, Gronovius, Elliott, and others, for species found the country over, and the names "coloradensis," "ioensis," "missouriensis," etc., of more recent writers for species which completely ignore the political limits of their native states. Asclepias syriaca L. is a classical example of the value of geographical names for species. The logical outcome of geographical names is seen in such absurdities as Crataegus raleighensis and Panicum auburne, and, when combined with a proper degree of illiteracy, in such nomenclatural atrocities as Crataegus colorado and C. shallotte. The genus Crataegus furnishes convincing proof that nomenclatural and taxonomic incompetence go hand in hand.

The practice of naming species after persons has absolutely nothing to commend it. As a rule, personal specific names are the result of a mistaken desire to honor some one, or of mere laziness. The day is long past in which a biologist can be honored by attaching his name to a species, and the honoring of other persons is not the province of nomenclature. It can not
be gainsaid that the use of personal names for species does obviate the necessity of knowing the species of a genus sufficiently well to avoid homonyms, but it is clear that such knowledge might at least make for more thorough systematic work. With respect to doublets, it is greatly to be regretted that the original rule of the Rochester Code was not permitted to stand. The Madison amendment has not only resulted in numerous absurd one-word binomials, but has actually weakened the cause of priority by making the latter override all considerations of accuracy and taste.
Greek and Latin in Biological Nomenclature

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