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## Shapes in Botanical Names: A Polyconfrontative Approach

### Abstract

In the following article the author concentrates on the problem of the usage of shapes in botanical binomial names from the polyconfrontative perspective. International Latin binomial names have been confronted with their English, Dutch, Polish and Czech equivalents to show the naming tendencies in the particular languages, while taking into consideration their compliance with the Latin botanical names. The presented results of this polyconfrontative study show the extent to which botanical names draw on shapes in the process of creating parts of species names, particularly the so-called specific epithet. The shapes have been divided into: basic geometrical shapes (also accompanied by a plant part), shapes showing resemblance (to another plant, an animal or a body part), containing a numeral and a plant part, describing structure and other shapes. The author also describes the items of the plant morphology the shapes in botanical names refer to (such as leaves, stem, fruit, flower/inflorescence etc.).

*Keywords:* shapes, binomial nomenclature, polyconfrontative studies, botanical names, morphonyms, specific epithet

### 1. Introduction

Before the publication of Linnaeus' systematics of plant naming in *Species Plantarum*, there was practically no universal way of creating unanimous plant names (Linnaeus: 1753). The importance of his work lied in the comments added by Linnaeus in the form a one-word common name on the margins (beside the descriptive phrase of each species), that resulted in the creation of the specific epithet. Before that the plants were given long complex names comprising their characteristics.

The system of Latin nomination proposed by Linnaeus was the inspiration to introduce the so-called binomial nomenclature, in which the first element of the name is the genus name in the form of a noun, whereas the so-called specific epithet is (basically) expressed in the form of an adjective. This contributed to the creation of a common base enabling the identification of particular species. At the same time the indigenous languages preserved the traditional plant names. As a result, there two parallel

systems of nomination function: the Latin one (to a certain degree universal) and the indigenous one (Stace: 1993, 37–43).

It should be assumed that the plant names (phytonyms) may be created on the basis of a different element in different languages, for example, in one language it can be formed based on the characteristic feature of plant morphology (morphonym), whereas in another the same plant may be named after a famous person (eponym).

The contemporary rules for plant name formation are specified in the International Code of Nomenclature for algae, fungi, and plants, which is regularly revised (the so-called Shenzhen Code of 2018 is currently in force) (Shenzhen Code: 2018).

## 2. Shapes in botanical names

Shapes in plant naming belong to one of quite common (popular) ways of creating the specific epithet in botanical names. The specific epithet is a result of detailing characteristics in the description of a certain species, therefore it mainly focused on the external appearance of a given species and as a result it referred to the shape to a certain degree.

Due to the variety (richness) of plant species around the world our material has been limited to the most represented families<sup>1</sup> of species native (or domesticated) to Poland and Dutch-speaking countries that at the same time (in most cases) have their lexical equivalents in English and Czech.<sup>2</sup> The results of the polyconfontative research will be presented with the consideration for answering the following questions:

- is it possible to observe naming tendencies in the particular languages taking into consideration their compliance with the system of Latin botanical names,
- to what extent the botanical names exploit shapes in the process of creating the specific epithet and which of them have the greatest impact on creating the names of taxa?

Species names containing a specific epithet that is based on a widely comprehended shape, can be divided into the following groups<sup>3</sup>:

- geometrical shapes (including shapes accompanied by the name of plant organ),
- names showing resemblance of a plant to other natural objects (plants, animals, body parts),
- names showing resemblance of the plants to everyday objects,
- names containing a numeral and the name of plant organ,
- names referring to general morphological structure of a plant.

1 The species from the following 29 families have been analysed: *Salicaceae*, *Polygonaceae*, *Chenopodiaceae*, *Amaranthaceae*, *Caryophyllaceae*, *Ranunculaceae*, *Papaveraceae*, *Brassicaceae* (*Cruciferae*), *Violaceae*, *Saxifragaceae*, *Rosaceae*, *Fabaceae* (*Papilionaceae*), *Onagraceae*, *Apiaceae* (*Umbelliferae*), *Primulaceae*, *Ericaceae*, *Boraginaceae*, *Scrophulariaceae*, *Lamiaceae* (*Labiatae*), *Gentianaceae*, *Rubiaceae*, *Campanulaceae*, *Asteraceae* (*Compositae*), *Potamogetonaceae*, *Liliaceae*, *Juncaceae*, *Cyperaceae*, *Poaceae* (*Gramineae*), *Orchidaceae*

2 All the species names have been taken from the works of the following authors: Anioł-Kwiatkowska (2003), Backer (2000), Heukels (1907), Kleijn (1970), Meijden (2005), Quattrocchi (2017) and the website botany.cz.

3 The characteristics of plant species have been retrieved from the online database of Royal Botanic Gardens in Kew – *Plants of the World Online*.

## 2.1. Geometrical shapes

### 2.1.1. Basic geometrical shapes

The most basic shape used to create a specific epithet is the respective size of the described plant. In this case, the equivalence of lexical units in the analysed languages with the Latin botanical name most commonly occurs ([1a], [2]). It is worth mentioning, that the size is not always expressed with the use of the same degree of the given property (positive degree of an adjective in place of the comparative).

Size can also be communicated indirectly as in [1b].

- [1a] LAT: *Pimpinella major*, NL: grote bevernel, PL: biedrzyńec wielki, EN: greater burnet-saxifrage, hollowstem burnet saxifrage, CS: bedrník větší
- [1b] LAT: *Festuca gigantea*, NL: reuzenzwenkgras, PL: kostrzewa. olbrzymia, EN: giant fescue, CS: kostřava obrovská
- [2] LAT: *Rhinanthus minor*, NL: kleine ratelaar, PL: szelężnik. mniejszy, EN: yellow rattle, little yellow rattle, hayrattle, cockscomb, CS: kokřhel menší

The specific epithet can be created on the basis of such basic geometrical shapes as circumference, circle (ring) or, as well, ellipse ([3] and [4]). What seems interesting, in the case of circumference, only the Polish botanical name includes this basic shape, whereas the other ones refer to the spiral arrangement of some plant elements. In case of the ellipse, there is neither a full equivalence of the exploitation of the given shape [4]. The ellipse occurs in Polish and in one of the synonymic (alternative) Latin botanical names. English has not created common name for this species, on the other hand Dutch specific epithet refers to the wedge shape of the leaves, whereas the Czech plant name contains both the shape (oval) as well as the element it refers to (see 2.2).

- [3] LAT: *Salvia verticillata*, NL: kranssalie, PL: szaławia okręgową, EN: lilac sage, whorled clary, CS: Šalvěj přeslenitá
- [4] LAT: *Rosa inodora* (*R. elliptica*), NL: wigbladige roos, PL: róža eliptyczna, EN = LAT, CS: růže oválnolistá

Another shape that is present quite frequently in botanical nomenclature is the sphere (globe). What seems important, it usually appears combined with an element that refers to a body part, particularly 'head'

- [5] LAT: *Allium rotundum*, NL: ronde look, PL: czosnek kulisty, EN: round-head leek, purple-flowered garlic, CS: česnek kulovitý
- [6] LAT: *Echinops sphaerocephalus* / *ritro*, NL: kogeldistel, PL: przegorzan kulisty, przegorzan lepki, EN: glandular globe-thistle, grat g.-t., pale g.-t., CS: bělotrn kulatohlavý

The cross may also be considered as a basic shape [7]. It does not, however, belong to the most frequent basic shapes used to create botanical names. In the foregoing example almost full equivalence can be noticed in the described languages, while only the item of plant morphology (*blad* – 'leaf') that influences the species name can be observed in Dutch.

- [7] LAT: *Gentiana cruciate*, NL: kruisbladgentiaan, PL: goryczka krzyżowa, EN: star gentian, cross gentian, CS: hořec křížatý, prostřelenec křížový, p. křížatý, hořec menší, střílové kořeni, prostřelené kořeni, prostřelenec

### 2.1.2. Basic geometrical shapes accompanied by the name of a plant organ

The most common parts of plant morphology are: leaves ([8], [9], [10]), flowers ([11], [12]) and petals ([13]). What seems interesting, there are few species that have the full equivalence of names in all the described languages [12].

- [8] LAT: *Lathyrus latifolius*, NL: brede lathyrus, PL: groszek szerokolistny, EN: perennial peavine, perennial pea, broad-leaved everlasting-pea, everlasting pea, CS: hrachor širolistý
- [9] LAT: *Diploxaxis tenuifolia*, NL: grote zandkool, wilde rucola, PL: dwurząd wąskolistny, EN: perennial wall-rocket, CS: křez tenkolistý
- [10] LAT: *Nasturtium microphyllum*, NL: slanke waterkers, PL: rukiew drobnolistna, EN: onerow yellowcress, CS: potočnice drobnolistá
- [11] LAT: *Rosa micrantha*, NL: kleinbloemige roos, PL: róża drobnokwiatowa, EN: small-flowered sweet-briar rose, CS: růže malokvětá
- [12] LAT: *Eleocharis quinqueflora*, NL: armbloemige waterbies, PL: poniklo skąpokwiatowe, EN: fewflower spikerush, few-flowered spike-rush, CS: bahnička chudokvětá
- [13] LAT: *Cerastium brachypetalum*, NL: kalkhoornbloem, PL: rogownica drobnokwiatowa, EN: grey chickweed, grey mouse-ear, grey mouse-ear chickweed, CS: rožec krátkoplátečný

## 2.2. Names showing resemblance of a plant to other natural objects

### 2.2.1. Names showing resemblance of plants to other plants

The other group of quite popular specific epithets that refer to the shape are those created on basis of resemblance to another plant. The resemblance can refer to the whole structure of other plant [14] or just to one of its organs ([15], [16]). In case of the second of the possibilities the organ is usually mentioned in the specific epithet.

- [14] LAT: *Stellaria graminea*, NL: grasmuur, PL: gwiazdnica trawiasta, EN: common starwort, grass-leaved stitchwort, lesser stitchwort, grass-like starwort, CS: ptačinec trávovitý
- [15] LAT: *Veronica hederifolia*, NL: klimopereprijs, PL: przetacznik. bluszczukowy, EN: ivy-leaved speedwell, CS: rozrazil břečtanolistý
- [16] LAT: *Arenaria serpyllifolia*, NL: gewone zandmuur, PL: piaskowiec macierzankowy, EN: thyme-leaf sandwort, thyme-leaved sandwort, CS: písečnice douškolistá

### 2.2.2. Names showing resemblance of a plant to an animal

As far as resemblance is concerned, the name of the plant can refer to an animal [17]. As seen in the example it may in its shape resemble an animal (in this case – ‘a snake’). The name refers to the shape of the plant roots. It is worth mentioning that the feature can be presented either in the specific epithet (NL, PL) or in the genus name (EN). The Czech names include it both in the genus name (*hadí kořen větší*) as well as in the specific epithet (*rdesno hadí kořen*).

- [17] LAT: *Polygonum bistorta*, NL: adderwortel, PL: rdest węzownik, EN: bistort, common bistort, European bistort, meadow bistort, snakeroot, snake-root, snakeweed, Easterledges, CS: hadí kořen větší, rdesno hadí kořen

### 2.2.3. Names showing resemblance of the plant part to a human or animal body part

The plant name may also refer to the resemblance of a plant organ to a body part. The resemblance can relate to human body parts, both external ([18], [25a,b]) and inner ones ([19], [20], [21], [22]) as well as to animal body parts ([23], [24]).

The resemblance expressed in the species name may refer to different parts of plant morphology. In example [18] the resemblance refers to the stipulae which may be perceived as the shape of ears. In this case, all the names follow the same naming pattern, therefore the full equivalency of names can be observed.

- [18] LAT: *Salix aurita*, NL: geoorde wilg, PL: wierzba uszata, EN: eared willow, CS: vrba ušatá

The name can also be the reflection of a feature that applies to the whole plant morphology. The plant species in [19] is covered with hair on almost all parts of its body (namely the stem, leaves, petals), hence its name. This feature is reflected in the specific epithet in all the discussed languages.

- [19] LAT: *Herniaria hirsuta*, NL: behaard breukkruuid, PL: połonicznik kosmaty, EN: hairy rupturewort, CS: průtržník chlupatý

On the other hand, the resemblance to inner part of body in example [20] refers to the fruit of the plant which is hidden in a sort of blister. This feature is expressed in the specific epithet in all the discussed plant names.

- [20] LAT: *Carex vesicaria*, NL: blaaszegge, PL: turzyca pęcherzykowata, EN: bladder-sedge, blister sedge, CS: ostřice měchýřkatá, ostřice puchýřkatá

A special case of expressing shape in species name can be seen in [21]. The reference to a body part can be found in both the genus name and the specific epithet of the Latin botanical name. In case of the genus name it may refer to the structure of the inflorescence and is also reflected in one of the English names (*lion's tail*). The heart that is included in the specific epithet of the Latin name (*cardiaca*) does not refer to any part of the plant but to its medical properties. However, it is worth mentioning that it is reflected in Polish and Czech in place of the Latin specific epithet.

- [21] LAT: *Leonurus cardiaca*, NL: hartgespan, PL: serdecznik pospolity, EN: motherwort, throw-wort, lion's ear, lion's tail, CS: srdečník obecný

One of the inner organs of human body expressed in the species names is the 'liver'. Example [22] seems worth analysing as it bears the resemblance of the leaves to the organ (similarity of the lobed leaves to the lobes of the liver) in two of its synonymic names, either in the genus name or in the specific epithet. The first pattern is preserved in the Czech name (*jaterník*). It is difficult, however, to determine whether the English and Dutch names are genus names or binomial names with specific epithet (there exist no

genus ‘-leaf’ or ‘-bloempje’). Nevertheless, the names contain the reference to the shape of the leaves. On the other hand, the Polish name bears no reference to the liver-shape leaves.

- [22] LAT: *Hepatica nobilis*, *Anemone hepatica*, NL: leverbloempje, PL: przyłuszczka pospolita, EN: liverleaf, CS: jaterník podléška, jaterník trojlaločný

The names of plants may also bear the resemblance of plant morphology to the shape of animal part of body. As seen in [23] the name may refer to the name may refer to a tail. However, the name may refer to a tail of a different animal as in Dutch (‘a cat’) and English (‘a fox’) or not express the bearer of this organ (as in Czech – ‘ocaszý’). The Polish and Latin (and one of the English) names do not mention the resemblance of the inflorescence to the body part, but rather show the way of its growth.

- [23] LAT: *Amaranthus caudatus*, NL: kattenstaartamarant, PL: szarłat zwisły, sz. ogrodowy, EN: love-lies-bleeding, pendant amaranth, tassel flower, velvet flower, foxtail amaranth, quilete, CS: laskavec ocaaszý

The other part of the animal body to the shape of which the plant names may show resemblance to are the ‘wings’. In case of [24] the name refers to the shape of the leaves and the shape can be observed only in the specific epithet of the Polish, Czech and Dutch species names. The other names do not follow this pattern.

- [24] LAT: *Scrophularia umbrosa*, NL: gevleugeld helmkruid, PL: trędownik skrzydlaty, oskrzydłony, EN: green figwort, water betony, water figwort, CS: krtičník křídlatý

Examples [25a] and [25b] refer to other human part of body, namely the ‘finger’, that may be accompanied by a numeral. In [25a] the resemblance is expressed directly in the Latin, Polish and Czech specific epithets, whereas in [25b] the Dutch name refers to the shape of the whole hand, while the English one is not accompanied by the numeral. In the other languages the specific epithet contains the numeral accompanied only by the part of the plant morphology not mentioning the part of human body.

- [25a] LAT: *Saxifraga tridactylites*, NL: kandelaartje, PL: skalnica trójpalczasta, EN: rue-leaved saxifrage, CS: lomikámen trojprstý
- [25b] LAT: *Veronica triphyllos*, NL: handjesereprijs, PL: przetacznik trójlistkowy, EN: finger speedwell, fingered speedwell, CS: rozrazil trojklaný

### 2.3. Names showing resemblance of the plant to everyday objects

Some of the plant names are created on basis of special kind of shapes – those that reflect ‘everyday’ objects ([26], [27], [28]). The object the names refer to be reflected in any part of the plant morphology: leaves ([27], [28]), fruit/infructescencia ([26]) or other (see 2.9 ex. 37). As can be seen in the examples below the objects that are used to create the botanical names are mostly connected to the shapes that brought in mind of contemporary botanists the comb (or needle) [26], a shield [27] or a sword [28].

As far as the degree of equivalence is concerned this may differ among the languages. For instance all the names in example [26] refer to an object (or its parts) that is long and spiky, namely the comb in Latin, Polish and Czech, and the needle in Dutch. The English names refer both to the ‘comb’ as well as the ‘needle’. Additionally, the shape is reflected in the genus name only in English, in the other described

languages it is the basis for creation of the specific epithet. What seems interesting only one of the English equivalents shows reference to the eponym in the Latin complex specific epithet (*veneris* – ‘Venus’).

[26] LAT: *Scandix pecten-veneris*, NL: naaldenkervel, PL: czechrzyca grzebieniowa, trybulka grzebieniowa, EN: shepherd’s-needle, Venus’ comb, Stork’s needle, CS: vohlice hřebenitá

On the other hand, the species names of a plant in example [27] does not show full equivalence among the described languages. The reference to the ‘shield’-shape of the leaves can only be noticed in the Latin name and the Slavonic ones (Polish and Czech) in the specific epithet.

[27] LAT: *Ranunculus peltatus*, NL: grote watterranonkel, PL: włosienicznik tarczowaty, EN: pond water-crowfoot, CS: lakušník štítnatý

Example [28] seems worth mentioning as the reference to shape is doubled in the Latin species name. The genus name contains the part that is based on the resemblance of the whole plant structure to the human body part – the head, and the specific epithet contains the reference to the size of the leaves. The other languages (except Dutch) bear resemblance of the long leaves to the sword. It is worth noticing that the Czech has an alternative plant name that shows full equivalency of the specific epithet to the Latin specific epithet (*dlouholistá*). The other English plant name in its specific epithet reflects the shape of the leaves from the other perspective (*narrow*). The most interesting seems to be the Polish names of this species. It follows almost the same procedure of name forming – the shape is doubled. It appears both in the genus name and the specific epithet. The genus name is created on the basis of the resemblance of the plant structure to a mace (*buławnik*) while the specific epithet shows the resemblance of the leaves to a sword (*mieczolistny*).

[28] LAT: *Cephalanthera longifolia*, NL: wit bosvogeltje, PL: buławnik mieczolistny, EN: narrow-leaved helleborine, sword-leaved helleborine, CS: Okrotice dlouholistá, okrotice mečolistá

### 2.3.1. Special cases – lack of plant part

Special cases of usage of other shape, particularly showing the lack of the part of plant morphology (in case of 29] – the stem) may also be found. The reference to the lack of the element is preserved in all the languages (LAT: ‘a-’, NL: ‘loze’, PL/C: ‘bez-’) but English.

[29] LAT: *Silene acaulis*, NL: stengelloze silene, PL: lepnica bezłodygowa, EN: moss campion, cushion pink, CS: silenka bezlodyžná

### 2.4. Names containing a numeral accompanied by the name of plant organ

Numerals accompanied by the name of the organ they refer to may also be considered as a special way of indicating shape in botanical names ([30], [31], [32]). In this case the organ that accompanies the numeral can be, among others, the flower/inflorescence [30], reproduction organs, i.e. part of pistil (style) [31] or petals [32]. As far as this group is concerned the names in the described languages show a very high degree of equivalence. There may only be a slight difference among the equivalents. As can be

seen in [32] in the Dutch plant name (*achtster*) the reference to the petals in the flower is shown indirectly through indicating the resemblance of the flower to a certain shape (*acht* – ‘eight’, *ster* – ‘star’).

On the other hand some differences in the plant parts the epithet refers to can be observed in example [27]. The Latin botanical name as well as the Dutch and Polish ones refer to the reproductive organs of the plant, while in the English and Czech name the reference applies to the result of the reproduction process – the seed.

[30] LAT: *Viola biflora*, NL: tweebloemig viooltje, PL: fiołek dwukwiatowy, EN: alpine yellow-violet, arctic yellow violet, twoflower violet., CS: violka dvoukvětá

[31] LAT: *Crataegus monogyna*, NL: eenstijlige meidoorn, PL: głóg jednoszyjkowy, EN: common hawthorn, oneseed hawthorn, single-seeded hawthorn, CS: hloh jednosemenný

[32] LAT: *Dryas octopetala*, NL: zilverkruid, zilverblad, bergavens, witte dryas, achtster, , PL: dębik ośmiopłatkowy, EN: mountain avens, eightpetal mountain-avens, white dryas, white dryad, CS: dryádka osmiplátečná

### 2.5. Names referring to the overall structure

There are several examples of plant names that are created on basis of the shape that refers to the whole plant structure not merely its part. As shown in example [33] and [35] the specific epithet is expressed through a form of participium in all the discussed languages. On the other hand the structure of the plant can be perceived from different perspectives. It may express the feature as in Latin (*flexuosa*), Dutch (*bochtige*) and Czech (*křivolaká*). This can be also seen as the result of the same action (PL: *pogięty*) [34] and finally, it can be reflected indirectly through the resemblance to other objects as in the English example.

[33] LAT: *Gypsophila repens*, NL: kruipend gipskruid, PL: lyszczec rozesłany, gipsówka rozesłana, EN: alpine gypsophila, creeping baby's breath, CS: šater plazivý

[34] LAT: *Deschampsia flexuosa*, *Avenella flexuosa*, NL: bochtige smele, PL: śmiałek pogięty, EN: wavy hair-grass, CS: metlička křivolaká

[35] LAT: *Campanula glomerata*, NL: kluwenklokje, PL: dzwonek skupiony, EN: clustered bellflower, Dane's blood, CS: zvonek klubkatý

### 2.6. Names created according to different patterns

In some cases the shape used in creating the botanical name may be different in particular languages. For example the species in [36] has two synonymic Latin botanical names due to changes in the classification of the plant. One of the specific epithets is based on the resemblance of the plant organs to an animal (*echinata* – ‘hedgehog-like’), the other one is based on a basic shape (*stellulata* – ‘star-like’). In the described languages the epithet is formed either according to the first pattern or the second one. The Polish and Dutch epithets are formed on basis of the basic shape (NL: ‘*ster-*’, PL: ‘*gwiazdkowata*’), whereas the Czech epithet makes use of the resemblance to an animal (*ježatá*). The English names follow both patterns, whereby the resemblance to an animal is expressed indirectly (*prickly*). The names in example [37] also follow two patterns of creating names on basis of the shape – one is connected to other shapes (objects), the other one – to the structure. The object that the names refer to is a coin, whereby the Latin and Czech



names refer to a coin in general, the Dutch and English ones refer to a particular type of coin. On the other hand the Polish specific epithet and one of the English synonyms refer to the structure of the plant.

[36] LAT: *Carex echinata* (*C.stellulata*), NL: sterzegge, PL: turzyca. gwiazdkowata, EN: star sedge, little prickly sedge, CS: ostrice ježatá, tuřice ježatá

[37] LAT: *Lysimachia nummularia*, NL: penningkruid, PL: tojeść rozesłana, EN: creeping jenny, moneywort, herb twopence, twopenny grass, CS: vrbina penízková

### 3. Conclusions

As was shown in the examples the shape is a very common component in creating the botanical names of plant species. The most frequent shapes occurring in the specific epithet are: the circle, ellipse and globe, often accompanied by the element of the plant morphology it refers to. The most frequent plant elements to which the shapes in the specific epithet refer (directly or indirectly) to are: flower, inflorescence, leaves and petals. The less frequent ones include: stem, root and other organs of the plant morphology. The degree of equivalence of the names may vary in the described languages. In most cases the Slavonic languages (Polish and Czech) make use of the same element in the specific epithet as in the Latin species name.

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