POINT OF VIEW

§193 and §246 of *Philosophia botanica* do not support that Linnaeus was a "typologist"

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DOI https://doi.org/10.1002/tax.12211

Abstract §193 and §246 of Linnaeus's *Philosophia botanica* have recently been invoked to suggest that Linnaeus used, or even introduced, the "Method of Type", which implies that a genus is centred around a "typical" species. However, there is no support for this conclusion in either of the two paragraphs, rather the opposite. A recapitulation of the last twenty years' reassessment of Linnaeus's taxonomic philosophy is given.

Keywords essentialism; history of taxonomy; taxonomic philosophy; type concept; typology

■ INTRODUCTION

Before considering the main theme of this paper – the alleged "typology" of Linnaeus – I will briefly summarise the last two decades' reappraisal of Linnaeus's taxonomic philosophy, to put the matter into a broader context. Lately, many or most discussions on type concepts, the history of taxonomy and/or pre-Darwinian taxonomic paradigms have been published by non-taxonomists in non-taxonomic journals. Although at times a bit out of touch with taxonomic principles, their main message is nevertheless reasonably consentient, and taxonomists could learn from it. For a fuller list of references, I beg you to consult the papers by Winsor (2006b), Müller-Wille (2013) and Witteveen (2018).

Linnaeus reclaimed. — The late 20th century Cain/Mayr narrative about the "typological" or "essentialist" nature of pre-Darwinian taxonomy has been exposed as a rhetorical ploy, and mostly laid to rest, thanks to the works of Härlin (1999), Skvortsov (2002), Winsor (2003, 2006a,b), Müller-Wille (2007, 2011, 2013), Richards (2010), Lidén & Kårehed (2018) and several others. The times are past when we could read in a scholarly publication:

> … the method [Linnaeus] adopted was to classify by the rules of Logical Division, which involve the determination of the essence of each entity. (Cain, 1958: 162)

or the equally fictitious:

> … the terms used by [Linnaeus], like "genus," "species," "name," to "know," and "natural system," have the very special meanings which these terms have in the system of scholastic logic. (Mayr, 1982: 173)

Instead, we find that Linnaeus actually *breaks* with the analytic "downward" logical division (from the whole to the parts; the *diaíresis* of Platon), and that he uses the terms "genus", "species" and "natural system" in the same sense as we do today. Linnaeus is the first to clearly lay out a conceptual basis for the natural system, and he emphasises that to discover natural taxa, a synthetic approach is essential:

> A teacher takes you from the whole to the parts, for pedagogical reasons. To discover, on the other hand, we must start with the parts and proceed to the whole. (Docenti procedendum a generalibus ad singularia quaeque, dum inventa explicat; ut Inventori, contra, a singularibus ad generalia eundum fuit.) (Linnaeus, 1737: Ratio Operis [p. 2] no. 8, based on Boerhaave, 1720: 4)

Magnol (1689), and Boerhaave (1720) held similar, although implicit, notions of naturalness, whereas Cesalpino (1583), Ray (1682), Rivinus (1690) and Tournefort (1700) tried to pin down *the* essential characters that would divide the whole into groups that also made intuitive sense. As they gave priority to characters over groups, they – at least in the eyes of Linnaeus – still adhered in principle to Platon's successive Logical Division, that Linnaeus rejected as a general approach:

> … using logical division, with hypothetical and arbitrary key-characters, they divided the plant kingdom into classes and orders all the way down to species, thereby

Article history: Received: 12 Nov 2019 | accepted: 17 Jan 2020 | published online: 13 Apr 2020
Associate Editor: Dirk C. Albach | © 2020 The Author.
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> tearing apart natural genera; … (Assumserunt enim Varii diversas partes fructificationis pro principio Systematico, & cum eo secundum divisionis leges a Classibus per Ordines descenderunt ad Species usque, & hypotheticis ac arbitrariis his principiis fregerunt & dilacerarunt naturalia, nec arbitraria genera; …) (Linnaeus, 1737: Ratio Operis [p. 2] no. 8)

A timeless timeline. — The Linnaean canon "Characterem non constituere Genus" (genera are not defined by characters; Linnaeus, 1751: 119) prefigures our modern concept of natural taxa as individuals: "without the mind, not within;—in nature, not in art" (Whewell, 1840: 474). Ergo, taxon diagnosis is secondary to taxon recognition, the latter being a *discovery* process. There is conceptual harmony between Linnaeus's ideas and todays "cladistic" approach, with Candolle (1819, 1827) and Darwin (1859) as upholders; taxonomy as science, not art.

A parallel antithetical paradigm, that denies ontological status to taxa other than species, proceeds from Adanson (1763) via Lindley (1830) to, e.g., Gilmour (1937), and is integrated into the eclectic "Evolutionary Systematics" school (e.g., Mayr & Bock, 2002), which, if not overly kicking, is at least still alive. Ironically (because Mayr & Bock claim the exact opposite), the latter formally subscribes to the practice of Logical Division that Linnaeus scorned: the *have not* [x] (versus *have* [x]) that delineates so called "paraphyletic taxa". In this tradition, the term "natural" is Newspeak and carries no ontological commitment.

A third class of systems can be added, to wrap up this short taxonomy of taxonomies: the fantastic constructions, based on numerology, geometry and platonic forms, that appeared during the Romantic period (e.g., Fries, 1825; see Lindley, 1826). Linnaeus's materialistic approach survived them all.

In his printed works, Linnaeus did not elaborate very much on natural plant taxa *above* generic level. He gave (Linnaeus, 1738, 1751) a list of natural families (*Ordines Naturales*) with included genera but – true to his principles – without descriptions. In his advanced teaching, however, the natural families took a fundamental and substantial part. His seminars on this topic were published only after his death, by his pupils Fabricius and Giseke (Giseke, 1792), in a very interesting work (see Smith, 1824, for an exhaustive and insightful English commentary).

As Linnaeus considered the natural families too little known, and hence their use for practical purposes premature, he adopted for his encyclopedic works an explicitly artificial substitute of his own making, the *Systema Sexualis* (Linnaeus, 1735); a book-keeping device, with genera as basic natural sortals, but otherwise "synoptic", top-down.

■ WAS LINNAEUS A "TYPOLOGIST"?

So far, so good. However, I will argue that our reappraisal of Linnaeus is incomplete, and that he is still read (if at all) with coloured glasses. For example, there is widespread agreement, according to Witteveen (2016, 2018), that Linnaeus considered each genus to have a most "typical" species, i.e., that he introduced the "Method of Type" or the "classification type" that took various forms during the Romantic era. The concept is aptly articulated by Whewell:

> [a taxon] is determined, not by a boundary line without, but by a central point within; […]; by an example, not by a precept; in short, instead of Definition, we have a Type for our director […] which possesses all the characters and properties of the genus in a marked and prominent manner […] near the center of the crowd, and not one of the stragglers. (Whewell, 1840: 476–477).

I will examine the claim that Linnaeus relied on such "Types" for circumscription of genera. Witteveen will, a bit unfairly, stand in for several earlier authors; after having correctly outlined the history and meaning of different type concepts, and successfully rebutted some uninformed treatises of the same, he nevertheless got Linnaeus wrong:

> Linnaeus (1707–1778) never wrote about types. Still, he clearly falls in the category of those who used the classification type concept 'implicitly', … (Witteveen, 2016: 144)

The evidence he puts forward to support this thesis is, however, misconceived. It is based solely on two paragraphs (193 and 246) from *Fundamenta botanica* (Linnaeus, 1736), incorporated and (193) much expanded in *Philosophia botanica* (Linnaeus, 1751, cited here):

> **193. Nullus character infallibilis est …**

In this paragraph, Linnaeus suggests an algorithm how to prepare a general consensus description of a genus, what he calls its *character naturalis*. The complete "aphorism" translates (with non-trivial latin within brackets) as:

> 193. No genus description can be trusted, unless it has been tested for all species of the genus.
> It takes a most accomplished botanist to make a reliable genus description; it must be based on agreement between as many species as possible (*consensu specierum plurimarum*) because every species has characters not shared by the other.
> [Do like this:] describe exhaustively the flower and fruit characters of a first species (*primae speciei*); check all other species of the genus, and remove everything that disagree, and eventually you have your generic description.

In this subtractive work flow, the "seed" (*prima species*) can be *any* species; we will get exactly the same outcome. For obvious reasons, Linnaeus often started with a well-known or cultivated plant, if such were at hand. Note that

the circumscription of the genus is established more or less intuitively *before* a description is attempted, although potentially subject to revision with detailed comparisons (*collatio*). Importantly, there is no typical or foremost species implied.

Witteveen, however, interprets *prima* as "typical", which is unjustified given the context. But around this single mistranslation, he warps the whole paragraph to fit his postulate, in the process distorting it to become the very opposite of its intent:

> Linnaeus emphasized that only the most seasoned taxonomists could be trusted in their selection of classification types (Linnaeus, 1751, p. 193). Only the expert possessed the requisite tacit knowledge for selecting a truly typical species for each genus. (Witteveen, 2016: 145)

If we compare this claim of Witteveen's with what Linnaeus actually wrote, we find that there is zero correspondence. One gets the impression that it is an inherited presupposition, rather than a conclusion. Will the second piece of evidence bear out?

246. Si Genus receptum, …, in plura dirimi debet …

Linnaeus understood that a genus, as circumscribed by him, in the future might be recognised as two or more genera based on new evidence, and that one of the segregates must inherit the original genus name. To forestall ambiguity, Linnaeus suggested:

> 246. If a currently accepted genus needs to be split up […] the genus name should follow the most common and [/or] medicinally important plant.

Note that there is *nothing* here about typical species, or indeed anything begging for a taxonomists attestation, quite the opposite; simply an overoptimistic proposal on how to avoid practical and economic disturbance. But this pragmatic guideline is also misconstrued as evidence of typology:

> [Linnaeus] suggested that whenever a genus was to be split into two or more genera, the original genus name should be kept to denote *that* new genus that was most typical of the original genus (Linnaeus 1736, §246). (Witteveen, 2018: 453)

Again, there is zero support in Linnaeus's original for Witteveen's reading. §246 could rather be interpreted as a first hint towards *nomenclatural* types.

■ SUMMARY

Contrary to received wisdom, neither §193 nor §246 in Linnaeus's *Philosophia botanica* show even the slightest shade of typological thinking, and those who persist in pursuing this thesis will have to look elsewhere for evidence.

What about Linnaeus's taxonomic practice as evidenced in his encyclopedias? Suffice to say that *if* Linnaeus had worked according to the "Method of Type", why did he not refer to these "types" in *Genera plantarum* (Linnaeus, 1737, 1754), where not a single species is mentioned? Similarly, in *Species plantarum* (Linnaeus, 1753), no "typical" species are apparent.

Linnaeus sometimes (often?) failed to update the *character naturalis* when additional species became known; hence there are species in *Species plantarum* (Linnaeus, 1753) that do not fully agree with the genus description in the 5th edition of *Genera plantarum* (Linnaeus, 1754), and sometimes it is even possible to trace what had once been the seed-species. This fact has been used as an additional indication of an implicit typological approach. But to recast his lack of rigour into a taxonomic philosophy, that is certainly uncalled for.

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■ ACKNOWLEDGEMENT

Mats Thulin, Uppsala, encouraged me to submit these observations to a broader audience.

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