Tribune

GENUS AND FAMILY : CONCEPTS AND NATURAL GROUPINGS [1]

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A little over two hundred and fifty years ago Linnaeus (= Linne) began to maneuver his concepts of animal arrangement into Aristotle's logic of classes. Twenty-three years elapsed between the publication of his first and tenth editions of « Systema naturae ». The tenth edition (1758) is the acknowledged starting point of zoological nomenclature. Often forgotten but highly significant is the fact that he spent those intervening twenty years orchestrating the then known animals into the world of philosophy.

Linnaeus' genius was conceiving that science and philosophy can blend and that theology, though highly influential to his concepts, was not the all controlling unit. He was influenced by Aristotle's logic of classes, Plato's " essence " and Thomistic theology. This may be best explained by simplistic definitions:science attempts to delimit what is true; philosophy seeks to define truth; theology, which Linnaeus was unable to completely escape, intervenes in as much as the demands of faith supersede delimitation and definition. Understand, Linnaeus was polarized by the sixteenth century observation : *philosophia ancilla theologiae* (philosophy is the maid-servant of theology).

To a large extent, and unfortunately so, science has come to limit the genius of Linnaeus to « creating » the binomial system of nomenclature. Binomial nomenclature was extant hundreds of years before Linnaeus; his proposal established the binomial as unambiguous. The names and groups he offered are not important. The introduction of an unambiguous binomial nomenclature and the logic of classes and its application to biology are important because for the first time the diversity of living organisms was organized in a manner that revolutionized human thought. However, Linnaeus' philosophy remained Aristotelian and he was dedicated to the application of Aristotle's system of logic to classification (Tuxen, 1973). Later generations up to and including Darwin succeeded in excising Linnaean philosophy from Linnaeus' proposal while retaining the essence of a rigid hierarchy of categories and an unambiguous to take the step beyond seeing what others had seen to the realm of thinking what others had not thought. As a result Darwin's thesis on the origin of species has influenced biology for over one hundred years and Wallace is remembered for presenting a similar hypothesis that his theology would not allow him to expand.

Linnaeus provided the grist upon which Darwin and others worked. However, Darwin and others were leaders in initiating the shift from the concept of a utilitarian classification based on the procedures of logic that primarily functioned as an instrument for identification, to the much broader interpretation that the diversity of organisms resulted from evolutionary divergence (Mayr, 1969). Thus, there was a major shift from identification to classification and the process of reasoning became inductive rather than deductive. Recently, in nematology, there has been an inclination to revert to deductive reasoning in the formulation of classifications (Andrássy, 1976; Fotedar & Handoo, 1978; Siddiqi, 1986). In these classifications the categories above the species are based on an *a priori* arrangement of morphologic characters rather than on natural groupings as interpreted through known biology.

Linnaen classification has not been without opposition and criticism. Attacks on the system generally arise from an inability to comprehend a rigid hierarchy with an inherent need for arbitrary ranking. The assignment of intractable values to ranks within the hierarchy would paralyze the system into a desinence that would preclude improvement. Perception of the intrinsic subjectivity of the system allows for the incompleteness of our knowledge of relationships and presents us with the opportunity to test alternate models of relationship, thus maximizing information. Systematists should accept and welcome the fact that the system will forever remain provisional.

There are seven basic categories that prevail in the modern interpretations of Linnaeus' hierarchies. All are not those proposed by Linnaeus (classis, ordo, genus, species, and varietas) but those that new knowledge

designations were imperative and the prefixes super- and sub- were attached to the basic categories.

With no sense of the purpose of Linnaean hierarchy some other terms have been introduced and have, not unexpectedly, become the subject of confusion because they do not convey relationship nor do they add to perception of nematode biology. The terms referred to are : biotype, race and pathotype. On the other hand some terms that have received a notable degree of acceptance are : tribe, between family and genus, and group between genus and subgenus. However, as useful as they are, they have not warranted recognition by the International Commission of Zoological Nomenclature for inclusion in the rules for " binomial (trinomial) nomenclature ". It is not surprising that these perceptive

false faith or faith in a rigid system based on numbers cannot escape the reality that taxa are based on zoological realities. Categories, no matter how depicted are concepts; however, they are concepts based on natural occurring units.

The most objective of all categories remains the species, for a further discussion of the objectivity and definition of the species see Maggenti (1983). The species category differs from all other divisions in the hierarchy in that it signifies singularity, distinctness and difference (Mayr, 1969). Categories above the species are collective concepts inasmuch as they have the function of grouping and ordering by de-emphasizing differences between species and emphasizing affinities among groups of species. Mayr (1969) states : " Even

freeliving genera (where the biology is seldom known). However, this does not seem to be the case among the plant parasitic nematodes nor the animal parasitic nematodes. Over the last twenty to thirty years the number of nominal genera in Tylenchina has increased at a logarithmic rate. The recent revision of Tylenchina (Maggenti *et al.*, 1988) has accepted a 46 % reduction in the number of genera in Tylenchoidea and a 58 % reduction in the number of genera accepted in the Criconematoidea. The philosophy employed by this team of researchers, Luc, Maggenti, Fortuner, Raski and Geraert (1987), was that outlined above: seek phylogenetic units, ecological units and a generic niche; these precepts were extended to their logical conclusion - the family.

The family being an abstract concept of a naturally occurring assemblage of taxa (genera) cannot be given a nonarbitrary definition and therefore, the only assigned definition is nearly equivalent to that given for the genus by Mayr (1969): " A family is a taxonomic category containing a single genus or a monophyletic group of genera, which is separated from other families by a decided gap. " Once again it has been generally

gains as well as evidence of extinction are most evident.

There are some broad features or generalizations that, though not generally applied in systematics to distinguish the family, are applicable to the family concept. Unequivocally, families are older than genera and often world-wide in distribution. In general, and this should be given serious consideration among nematologists, the family should have a general facies easily recognizable. The latter is easily verified by our ability to recognize some families under the dissection microscope; this should not be interpreted as a mechanism to recognize families.

It should not be surprising that as knowledge of taxa increases world-wide that family designations often require rethinking. World-wide families have a tendency to internally break into distinctive groups and it is to be expected that intermediate groups will be found and quite often relic groups discovered that cloud the issues. One only has to consider recent finds among the Heteroderidae to confirm this generalization. When this occurs we have two choices: the known families can be raised to superfamilies (the simplest solution, though more often than not the least satisfactory) or we can

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