The Importance of Classification in Empirical Science

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1 Introduction

It is a pleasure to be able to contribute to this *Festschrift* for Professor Marian Przełęcki, undoubtedly one of the leading Polish philosophers of today, which in a country with such a noble tradition in scientific philosophy is no small praise. It has been my pleasure and privilege to have had dealings with Professor Przełęcki both in Austria and in Poland, and from my limited but I think not uncharacteristic experience I can truly describe him as one of nature's gentlemen. One of his principal concerns has been with logical aspects of empirical science. A number of themes that he has treated overlap with my own interests. These include quantity and measurement, vagueness and many-valued logic, the analytic/synthetic distinction, and truth. But he has gone further into these matters and I have nothing to add in these directions, so in this essay I shall discuss and emphasize another aspect of empirical science, one that has all too often been ignored, belittled or sidelined by both scientists themselves and philosophers of science, namely classification. There are a number of easily understandable reasons for the neglect of classification, but to ignore it, or, as is more often the case, to take it for granted, is to distort our view of science. Understanding the nature and role of classification in science also illuminates matters with which Marian Przełęcki has concerned himself, especially with regard to language, truth and logic in empirical science. The topic will also highlight a major respect in which philosophy in general and the philosophy of science in particular has moved on in the generation between Professor Przełęcki and myself, namely in the greater emphasis on matters of ontology and metaphysics.

2 The Underappreciation of Classification

It is easy to see why classification may appear to be a minor aspect of scientific practice and theory. The dramatic and glamourous parts of science have to do with such matters as unexpected discoveries like that of penicillin, vulcanization, or the skeletal remains of Lucy (*Australopithecus afarensis*); daring but successful predictions like the locating of Neptune, continental drift and the positron; dramatic theoretical breakthroughs like Einstein's special relativity and Schrödinger's wave equation; or the great works culminating huge efforts, like Newton's *Principia*, Laplace's *Mécanique céleste* or Darwin's *Origin of Species*. By contrast the job of sorting specimens and phenomena into classes appears to be mundane, humdrum, unexciting, the perfect job for scientists with a limited imagination and a fear of fieldwork. The taxonomist is seen as a dusty museum-bound pedant, or a nerd who has not outgrown teenage collecting. Taxonomic disputes are seen as merely verbal quibbles fought well behind the front line of new and ground-breaking research.

Modern philosophers of science have not helped this neglect. Philosophy of science has often focussed on the dramatic episodes of science, in particular the theoretical upheavals of new "paradigms" overthrowing the conservative *status quo* and highlighting the role of the unconventional and mistrusted revolutionary, from Copernicus to Darwin to Wegener. The transformation of philosophy of science in the twentieth century with the advent of modern logic, and the attendant focus on the logical structure of scientific theories, and their verification, falsification and corroboration, while it stresses the linguistic medium of scientific discourse, has looked to logic—whether proof-theoretic derivation or model-theoretic representation—for a scientific account of the meaning and structure of scientific theories. The increasing mathematical sophistication of scientific theories has led to questions as to how mathematics and the purely formal structures it describes can be so successful in providing the medium for so much science. As for classification itself, we are in possession of a powerful tool—set theory—which far outstrips the meagre tools available hitherto, and which took up such an inordinate amount of time and space in old logic manuals. A glance at books on logic and philosophy of science from the nineteenth century shows these to have been almost obsessed with such matters as whether classification is or should be dichotomous, or the correct way to classify the sciences themselves. Such matters almost completely vanish from consideration in the twentieth century.

Without in any way decrying the importance of any of the aspects of science and its philosophy mentioned so far—with the exception of set theory—it is my conviction that scientific classification, unglamourous and undramatic as it often is, is an absolutely indispensable and basic part of scientific theory and practice, that its ramifications reach into all parts of science, and that taxonomic best practice in science not only illustrates how and why classification is important, but also provides salutory lessons for philosophers—and not just philosophers of science.

3 Terminological Matters

We begin by clarifying some matters of terminology and nomenclature, since even the term ‘classification’ is itself ambiguous.

Classifying is an activity: to classify, in its most basic sense, is to treat objects (entities or phenomena) in some given domain (which need not be exact in scope) in two or more different ways, depending on some actual or assumed features distinguishing them. In this very broad sense, perhaps all living creatures classify: bacteria swim towards nutrition and away from toxins, plants adjust their configuration and growth according to the directions of gravity, water and light sources, animals actively seek food and mates and shun predators. We can call this general differentiated treatment *distinguishing*. Distinguishing lies at the basis of all cognition: to cognize is in the first instance to discern differences.

We shall however restrict our attention as usual to the chattiest of animals, *Homo sapiens*. Humans, like other creatures, are born with or naturally acquire the ability to distinguish many kinds of stimuli and react differentially to them, and this provides the basis for our uniquely differentiating linguistic skills, which themselves furnish the indispensable basis for science. With language, humans manifest themselves as natural classifiers, and the linguistic repertoire of a human’s language includes a plethora of local taxonomies. These include: other humans, their actions, appearances, social roles, possessions, and locations, all kinds of natural phenomena such as weather, diurnal and annual cycles, the heavens, landscape and its features, animals and plants, food and drink, dangers and desiderata, birth, growth, illness and death, in short, all the things that crowd into any human’s life. These are often called ‘folk taxonomies’. I don’t like the term: it is condescending. It connotes naïvety or lack of reflection and scientific sophistication. In fact naturalists have frequently observed that the local flora and fauna taxonomies of so-called primitive peoples are frequently extremely accurate and sophisticated. I prefer instead to call the taxonomies explicit or implicit in the use of a natural language *vernacular taxonomies*.

That brings us to disambiguation. The term ‘classification’ can refer either to the activity or practice of classifying, or to the product of such activity. Where it is necessary to disambiguate I shall refer to the activity as *classifying* and the product as a *taxonomy*. Then there are two things that can be meant by ‘classifying’. One is simply the activity of placing an observed specimen, from a supernova to a songbird, into a class—preferably the correct one—in a pre-existing taxonomy. This is the sort of activity beloved of amateur astronomers, ornithologists and botanists, and none the worse for that. Biologists call this activity *identifying*, as it consists in identifying the kind to which the specimen belongs. It is clearly to be distinguished from the activity of creating or (more frequently) modifying an existing taxonomy, by adding, subtracting, merging, splitting, or rearranging. Let us call this latter activity *taxonomizing*. It falls to only a few seriously to engage in taxonomizing. Scientists who discover a new kind of entity naturally want to see how it changes extant taxonomies. More subtly, sometimes classes in a taxonomy that were previously considered distinct turn out to be one, for example larvae of some crabs were once thought to be a separate genus, *Zoea*, and sometimes entities thought to be of one class turn out to be of two or more, as heavenly point light sources turned out to comprise three different kinds of object: stars, planets and galaxies, or birds once thought to be one species are split into closely resembling sibling species. When it comes to classifying then, all creatures distinguish, nearly every human identifies, but only a few humans taxonomize.

4 Divisions and Taxonomies: Formal Features

Taxonomies (classifications) have been much studied over the centuries, but attention has tended to be focussed on just one kind of taxonomy, one which consists of a domain (*summum genus*) uniquely divided and the classes in the division further uniquely subdivided, until undivided classes are reached. This is the familiar kind of nested hierarchy of classes. They are generally represented graphically by a branching structure resembling a tree. But while such taxonomic structures are important, especially in certain fields, they are by no means the only ones that need to be considered, and the attempt to force all taxonomies into this form can do violence to the kinds in many domains. So we shall need to cast the net more widely. For this purpose it is expedient to develop some terminology.

We suppose given a domain D of objects (of which there are at least two).

- A *division* of D is a collection of at least two subclasses of D.
- A division is *exclusive* if no object of D is in more than one of its classes.
- A division is *exhaustive* if every object of D is in some class of the division.
- A *partition* is a division which is exclusive and exhaustive of its domain.
- A division is *proper* if no class of it is D and none is empty.
- A *perfect* division is a proper partition.
- Two perfect divisions $\{A_i \mid i \in I\}$, $\{B_j \mid j \in J\}$ of a domain D are *crossed* when for all $i \in I, j \in J$, $A_i \neq B_j$, that is, no two classes of the divisions are identical.
- A division is *intrinsic* if it is based on intrinsic features of the its objects.

- A division is *extrinsic* or *relational* if it is one based on the relations its objects have to other things.
- A *natural* division is one based on natural, pre-given distinctions, features or relations.
- A division is *essentialistic* if it is based on essential characteristics of its objects.

Every division is a taxonomy but not vice versa, because typical taxonomies consist of more than one division.

- A *flat* taxonomy is one consisting of only one division.
- A *crossed* taxonomy is one which consists of two or more crossed divisions.
- A *nested* taxonomy is one where there is only one immediate division of the domain, called the *top* division, and some or all of the classes in the top division are further subdivided in the same way (each divided class has only one division), and no divided classes have more than one division.
- The *depth* of a nested taxonomy is the largest number of divisions between the domain and the undivided classes. A flat taxonomy has depth 1, a nested taxonomy has depth of at least 2.
- A taxonomy is *dendritic* (that is, treelike) if it is nested and has a finite depth. The domain of a dendritic taxonomy is the *root taxon*; the undivided classes are the *leaf taxa*.
- A taxonomy is *precise* if it is determinate for every object and class whether or not the object is in the class.
- A taxonomy is *vague* if it is not precise.

We will need one or two more definition later, where they will be given in the text.

5 Requirements of a Good Taxonomy

Aristotle, the pioneer of scientific taxonomy, set the standard for later taxonomies. Following his work, it has often been thought that a scientific taxonomy is best when it is

1. Dendritic
2. Perfect throughout

3. Natural
4. Intrinsic
5. Essentialistic
6. Precise

All of these characteristics are generally desirable, some more so than others. But none of them turns out to be essential to all taxonomies. All colour taxonomies are more or less vague, as indeed are biological taxonomies, especially in the diachronic dimension. Taxonomies of people divided according to profession, occupation, place of birth or place of residence are non-essentialistic, as all these features are accidental; place of birth, residence, nationality are additionally all non-intrinsic; while nationality is non-natural. Perfection in taxonomies is often not achieved because domains are not exhaustively known. Every year sees new species of organisms added to existing taxonomies: new spiders, new insects, new plants, new bacteria, and so on, all have to find a new place in the overall taxonomy of biota. Of course an exclusive division can always artificially be made perfect by adding to a divided class a "wastebasket" or "catch-all" class given by the formula 'none of these, but of this kind'. Then undiscovered, undetermined or unclassified entities within the overall class can find a home here, but since any further determination placing them in a new taxon will require revision of the division anyway, little is gained by adding the catch-all class, since the new entities will typically (though not always) be in a known genus. Finally, dendritic taxonomies, while often desirable, are not always appropriate. Fundamental particles for instance are divisible according to rest mass, charge, spin, and other quantum characteristics, no one of which takes priority over the others. The chemical elements come in different classes according to their chemical properties, but again these are not most helpfully and correctly organised into a classification tree: the periodic table of elements is precisely non-dendritic in form.

Of all the six features mentioned above, the single most important one is number 3: a scientific classification should always aspire, where the subject matter admits, to be natural, to "cut nature at the joints". In matters of society and culture, this is not always possible. Music genres, for example, are notoriously artificial. But away from these areas, natural classification is both standard and desirable. The objects of the domain and not the taxonomist's choices dictate the taxonomy. Where this desideratum is not observed, for example in the various astrological classifications of human temperament according to the year, month or day of birth, we have pseudo-science, not real science. The historically more disastrous pseudo-scientific taxonomy of human beings according to “race” was not wholly unfounded, in that salient phenotypic similarities and dissimilarities often covary with genetic distance. But two features of the racial taxonomy rendered it unscientific. One was the lack of covariation in the case of dark-skinned Africans. To lump all dark-skinned Africans together as one “race”, from a wholly superficial Eurocentric perspective, went against the later discovered fact that the genetic variation among dark-skinned Africans is greater than that among all the rest of humankind put together. The other and more patently sinister side-effect of such taxonomy was of course to sustain prejudicial myths of racial supremacy under the superficial guise of scientific fact, when there was no such fact in view. There is an evaluative lesson in this which would not be lost on Marian Przełęcki, namely that evaluative use of scientific facts, including taxonomic facts, is always to be flagged explicitly as evaluative, and furthermore is always subject to the caveat that *every* scientific classification is *pro tem*, and is open to revision in the light of future discoveries.

6 Where Taxonomy Rules I: Library Science

While every science has to engage in classification and use taxonomies, there are two in particular where classification is paramount. One is not a natural science and we begin with that because it offers the clearest lessons: it is library science. The objects in the domain of interest to this science, and to its theorists and practitioners, are documents. We are most familiar of course with books as the documents in question, and since we are interested here only in certain features of bibliographic taxonomy and this is not a primer in library science, we will concentrate on them, leaving the interesting but less relevant issues of archiving letters, official papers and the like to one side.

Librarians need to classify books for two reasons: storage and retrieval. These needs cut in different directions. For storage to be efficient it is easiest to store books according to size and the order in which they are acquired. In this way wasteful unused shelf space is minimized. But because libraries acquire books across many genres and subject matters and they are intended to be not just kept but read and otherwise used, so effective retrieval is important, books need to be classified in other ways, of which three in particular are crucial: author, language, and subject matter. Leaving the first two aside, let us consider the last alone, as it is in any case the principal dimension of book classification, especially in non-fiction.

Very few books are about one thing only. A book with the title *The Development of Military Uniform in 18th Century France* is about France, France in the 18th century, military uniform in France, military uniform in the 18th century, as well as what the title says. It could be classified in the history of France, the history of the 18th century, the history of military uniform, military history, the history of clothing. Similar books dealing with for example military uniform in 19th century Germany, or French military reforms, or the clothing of the 18th century, might be shelved close to this book or far from it, depending on how it and they are classified. Cross-classification is the rule, rather than the exception, in books.

Traditional library classifications such as the Dewey Decimal, Universal Decimal, Library of Congress and Russian Library–Bibliographic Classifications are dendritic, and so force a choice as to which of the various characteristics of a book's subject matter is to be taken as primary, which as secondary, and so on. This separates books with common subject matter, both physically, if they are not shelved together, and notionally, in the classification scheme. The solution to this problem was furnished by the most revolutionary of all library scientists, the Indian S. R. Ranganathan (1892–1972). Though never a household name, Ranganathan deserves to be remembered by all scientists and philosophers as the person who clearly formulated the principles by which any complex taxonomy should be organised. Ranganathan's type of taxonomy is called a *faceted classification*. Given a domain *D*, any respect in which the objects of *D* may be perfectly divided (partitioned) constitutes a *facet*. In any bibliographic subject-matter, and in any other domain for that matter, the objects of the domain may be divided in different ways. Facets are ways of dividing the objects of *D* which are mutually exclusive, and, as far as is sensible or practical for the domain in question, jointly exhaustive of the ways in which the domain can be divided. In logicians' terminology, each facet is a *determinable* characteristic, the values of which are *determinates*.

Consider for example the sweaters in a person's wardrobe, or a shop. They can be divided or grouped according to colour, style, material, country of provenance, size, price, manufacturer. Each of these is a facet. The same principles can be applied to any subject matter, even within a partly hierarchical classification, where the facets may change from one part of the taxonomy to another. For example among animals one facet is Number of Legs; this is inappropriate among trees, where however the division between Deciduous and Evergreen is relevant. Faceted classification, once remote and esoteric and known only to librarians, is set for wider use in classifying information on the internet for easier and more efficient access. It is the key to other forms of taxonomy too, as we shall indicate.

7 Where Taxonomy Rules II: Biology

Classification is central to biology, and it was Carl von Linné (Linnaeus), the father of modern taxonomy, who anchored it in this role, and made biological taxonomy the nested hierarchy or tree of life that it has remained. Linnaeus however followed Aristotle's principles, basing his classification on the physical appearance and characteristics of organisms, asssumed as essential characteristics. With the increasing discoveries of fossils and the advent of Darwin's account of evolution it became clear that the nested hierarchy was not static, that characteristics treated as essential could be gained and lost, and that kinds of organism varied over time, with new species arising and others going extinct. This led to a reinterpretation of the dendritic taxonomy of organisms as representing not only their similarities and dissimilarities but the branching phylogeny behind them. Evolutionary taxonomy, while still dendritic, had to be at least consistent with phylogeny, so that creatures with a common ancestor should be together in a taxon at some level in the hierarchy. The modern classificatory movement of *cladistics*, which is the predominant school of thought in modern biological taxonomy, was initiated under the name of 'phylogenetic systematics' by another radical taxonomist insufficiently known to the philosophical community, the German biologist Willi Hennig (1913–1976). The reason for branching a taxon into two (or occasionally more) other taxa is always and only for Hennig an event of speciation, the development of a new species. A diagram representing the purported history of such branchings among a group of organisms is a *cladogram*, and the group of all descendants of a single species is called a *clade*. With this, phylogeny becomes the sole structural principle of organic taxonomy. Cladistics discards the idea of a relatively small number of hierarchical categories such as Genus, Family, Order, Phylum, Kingdom, which had characterised systematics before, and for this reason, together with factional dissent among cladists, and other issues, such as its not taking account of varying rates of adaptive divergence, it has not always been adopted wholesale and uncompromisingly.

While it may seem as though the dendritic taxonomies of traditional systematists and cladists alike are as remote as possible from the unordered combinations of faceted classifications, there is an important link. Biological systematists, whether they deal with living organisms or are palaeontologists, hardly ever observe speciation in process, and never ever observe the distant past speciation events which led to branching and evolutionary divergence. They are therefore constrained to examine similarities and differences among either extant organisms or extant traces of organisms (fossils etc.) and infer phylogeny from the characteristics observed. Those features which indicate new descent from a common ancestor are called *synapomorphic characters*: they are features shared by two or more taxa and their presumed common ancestor but lacking from the ancestor's ancestor, and so presumed to have developed only once. It turns out that the best way of organising the data on characters that may play this indicative role is by facets: synapomorphic characters constitute one value of a facet shared by three or more taxa but not by other closely related ones.

The range of accessible facets has been hugely increased by the availability of rapid and comprehensive DNA sequencing, so that studies of organisms' genotypes adds considerably to the information available from their phenotypes. Unfortunately it also increases the complexity of inferring phylogeny from present relationships by orders of magnitude, so that putative phylogenies are nowadays often constructed on the basis of computer programs seeking the most parsimonious way of arranging lineages so that the observed characters result from the fewest possible speciations. While these methods of inferring descent from comparison of characters are subject to caveat and criticism, especially when applied dogmatically, and while matters have been further complicated by the now acknowledged frequency and significance of horizontal (lateral) gene transfer (HGT), it remains the case that a faceted treatment of the characters of organisms lies at the basis of the classification of organisms. Organisms' lines of descent no longer form a neat tree, thanks to HGT, but the principle of inferring the order and nature of modification, whether by standard ("vertical") parent–child relationships, or by HGT, still rely on an initially non-hierarchical grouping of characters into families (facets).

8 Taxonomy in Other Sciences

While other sciences place less central importance on taxonomy and on taxonomic principles, it is still ubiquitous and important, whether in organic chemistry, mineralogy, astronomy, physics, linguistics, or sociology. A few brief illustrations must serve here. While the mathematical techniques of physics dominate over taxonomic issues, they also serve taxonomy: the fundamental particles of the standard model of particle physics fall into families defined by facets such as mass and spin, while stars are classified according to mass, age, temperature and several other characteristics, with different categories of star experiencing different life cycles and ultimate fates. In linguistics the presence of extant and recent similarities, the transitions among which were studied in 19th century historical linguistics, give rise as in biology to a phylogenetic tree of languages bearing no accidental resemblance and often causal connection to the genetic similarities and inferred descent and separation of human populations. In medicine specialisms may be defined by more than one division of illnesses and disorders, whether systemic (liver, respiratory, cardiovascular, neurological), age-specific (obstetrics, paediatrics, geriatrics), mode of transmission (airborne, water-borne, contagious), nature of disruptive agent (virological, bacteriological, toxicological, oncological), or mode of treatment (physician, surgeon, radiologist, psychiatrist). Medicine apart, whose aim is practical, the aim of sciences as such is not to classify: it is to understand and explain; but without sound taxonomic principles and good working taxonomies these ultimate aims of science are not realizable.

9 Lessons for Philosophy

Classification as a matter for theoretical interest and concern has long since disappeared from the menu at the philosophical dinner-table, and some of the reasons for this were mentioned in Section 2. I want to draw some positive and negative lessons from our quick survey of matters taxonomic in this paper for the practice and future of philosophy, including not just the philosophy of science itself, where the lessons are fairly evident, but also in my own speciality of metaphysics and ontology. Modern analytic philosophy was born in the effort to understand the nature of mathematics and the logic that governs it: the tools forged in that effort were turned onto understanding the logic of science and they also radically enhanced the workbench of philosophy itself. But a preoccupation with mathematics and logic has not always been healthy for philosophy. The formal sciences, Quine notwithstanding, are radically different from the empirical sciences, and the *a priori* taxonomies of mathematics are very unlike the *a posteriori* ones of empirical science. Ernest Rutherford reputedly quipped that “All science is either physics or stamp collecting.” By this he was not only exalting physics because of the necessary sophistication of the mathematics required to deal with the innards of physical phenomena: he was also belittling taxonomy, which looms larger elsewhere. The sciences other than physics, echoing Rutherford we might ironically call them the *philatelic* sciences, in many cases resort to descriptive, phenomenological and taxonomic treatment not because they are inherently unmathematical, but because the mathematics they would need were they to be done in the way that physics is done is far too complex for anyone, including a physicist, to master.

The one mathematical tool that philosophers interested in taxonomy should avoid at all costs is set theory. Set theory was conceived by Bolzano and developed by Cantor as a tool for mastering the transfinite. As such it needed to be vastly more powerful than the traditional algebra of classes. In the wake of the disappointment at the failure of logicism it became a substitute for that logical foundation, and infiltrated mathematics not least as a handy *lingua franca*. In the hands of mathematically-minded philosophers such as Quine and Montague it was propagated as a new ontology rendering obsolete the traditional concerns with properties, relations, classes, events, actions, times and places. Everything could be done by set theory, including classification. But set theory is far too powerful: it does not discriminate between natural and gerrymandered classes, it encodes but does not help to understand the notions it supplants, and it requires a Platonistic ontology of praeter-transfinite proportions. Much of the terminology of set theory can be adapted to less unnatural and extravagant collections, but the hardcore ontology should be jettisoned. Above all set theory trivializes the ontologist's search for categories, the highest genera of things. Philosophers from Aristotle to Whitehead obsessed about categories, but when everything is either a set or an urelement, what else is there to do as regards taxonomy? The set theoretical philosopher says: nothing. But the answer from the point of view of empirical science is: everything.

Taxonomy in empirical science is no longer doctrinaire: it is flexible and adaptable to the domain. Classification in chemistry, zoology, medicine, sociology and so on is not bound by the Aristotelian paradigm. It is generally indifferent to matters of essence versus accident, except at a relatively unproblematic nomenclatural level. Scientists do not obsess as philosophers do about intension versus extension, sense versus reference. The distinction exists, but is wielded lightly: the main concern of scientists is to craft the words that will ensure they get their *extensions* right, that they cut nature at her own joints. If need be, they will change ("tweak") the terminology to get it right: if genetics tells us that the hominids and the other great apes form a clade, then so be it: the "other great apes", the *Pongidae*, will disappear as a valid biological taxon, important though the distinction between them and us remains. If there turn out to be (as there did) particles with the same mass as electrons but with positive charge, scientists can choose either to extend 'electron' to cover these and find two new terms, or reserve 'electron' for the original case. In fact scientists opted for the latter course and called the newly discovered particle 'positron'. But its empirical discoverer Carl Anderson wanted to use 'electron' as the generic term and rename the old negatively charged lepton 'negatron'. Arguably his suggestion was better than the one adopted, since we now lack a simple term covering both positrons and electrons, but no science was made worse thereby.

In metaphysics the chief lesson one can draw from empirical taxonomy is the importance of facets or characters. One of the chief complaints about the ontological treatment of categories is that no two ontologists can agree as to what the categories are, yet they are supposed to be really important in metaphysics. It contributes in no small measure to the impression that metaphysics is less of a science than a *Weltanschauung*. While no panacea, a faceted, or as I prefer to say, *factored* treatment of the fundamental divisions among things allows metaphysicians to back away from deciding which divisions must be paramount. Metaphysics need not be tied to an Aristotelian, dendritic model of its taxa: there need be no single "approved" or "correct" system of categories, but rather a faceted mosaic of kinds.

It turns out that facets or factors make occasional but significant appearance even in the history of metaphysics. Aristotle himself classified "things said without combination" into those that are or are not said of a subject (±Predicable) and those that are or are not in a subject (±Inherent). Crossing these two divisions gives us the fourfold classification of individual substances, individual accidents, universal kinds and universal characteristics. Empedocles divided the four ancient elements by the facets of temperature (hot/cold) and humidity (wet/dry) and the four pairwise combinations yielded earth, air, fire and water. More recently, the great Polish phenomenologist Roman Ingarden proposed a taxonomy of basic kinds of objects (modes of being) based on consistent combinations of facet values that Ingarden called *existential moments.* These moments came in small families, which we can call facets of being or ontological factors. While none of these schemes meets my metaphysical approval, the *method* of attempting to get at categories, that is, fundamental classes of entity, by anatomizing objects' crucial characters or factors, and their factor families or facets, adopts empirical science's best practice and promises to make metaphysics more useful, more responsive to discovery, more like empirical science in rejecting the top-down, *a priori*, linguistic or mathematical approach in favour of a bottom-up, synthetic, science-guided and *a posteriori* approach. For some this would mean the enterprise no longer deserves the epithet 'metaphysics'. No matter: without wishing to belittle the differences between it and the special sciences, such an overarching, organising, synoptic and taxonomizing science is as scientifically necessary now as it was in Aristotle's day: what it is called is secondary.