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ON THE DOCTRINE OF NATURAL KINDS.

By M. H. TOWRY.

During a long study of Taxonomy, it has repeatedly seemed to me that some obscurity and indefiniteness, if not error, hangs around Mill's doctrine of Natural Kinds, and it is rather to draw forth the views of others than to gain expression for my own ideas that I take up the subject in this paper.

I fancy most logicians will agree with me that the keystone of the process of classifying is the doctrine of extension and intension; that the *fundamentum divisionis* is a purely subjective conception; that Discrimination, Abstraction and Generalisation are our working tools in construction; that the whole purport of classifying is the mental methodisation of our knowledge of individuals. Could the mind grasp and retain a full presentation of each Thing, instead of thinking in sequence, the contrivance would be needless.

Further, numerical enumerations are the only classifications that proceed on extension alone; arrangements based on pure intension would be equally unfruitful of results. The only legitimate classifications work on extension, proceeding by intension.

Now, it appears to me that Mill's doctrine of Natural Kinds controverts the whole procedure and *modus operandi* of logical classifying, rests on an arbitrary and untenable proposition, and stands in his theory, like the pillar of Roslin chapel, irreconcilable with the rest of the structure. Moreover, it is alien to the actualities obtaining, so that on both counts it surely should be examined, and either be remodelled or replaced by a truer doctrine.

To make out my indictment it will be needful first briefly to glance at uncontroverted points of theory, in order to demonstrate what an alien stumbling-block the doctrine introduces.

The Predicables were originally not a formal scheme of Classification, but an outline of the co-relations of General Terms. The basis selected by logicians on which to found an exhaustive comprehension of General Terms was that of the relation between the subject and the predicate.

Of the two general terms which form the subject and predicate of any proposition, one, they said, might stand to the other in any one of five relations. Hence it followed that, as these distinctions were entirely relative, some general terms might be, in different sentences, either genus or species, and others either differentia, property or accident. In a short time this meaning of the Predicables was laid aside, and the names were used in the formal analysis of classifying which laid down the requisites of correct diataxis and subdivision. The Predicables were applied not to the general terms, but to the divisions and attributes themselves, and this meaning has so largely displaced the former

that in many treatises of logic the earlier is not noticed. Lastly, four of the Predicables have been a third time appropriated, and are used by biologists in a technical sense.

By means of Likeness (an ultimate element) Things are to be thought of "in those groups respecting which a greater number of general assertions can be made, and those assertions more important than could be made respecting any other groups into which the same things could be distributed" (Mill).

After all this arranging of Things by means of intensive attributes mentally abstracted from the things (for subject and attribute are in reality one, as Prof. Bain and Mill emphatically show)—after all this, we are told that there are in nature Divisions of Kind, bounded by impassable barriers. At first sight this seems an unlooked-for harmony of the actual with the theoretical. Here are Classes ready formed for us. But let us listen to their definition and criteria, and perplexities thicken.

Mill says that a Kind is one of those classes which are distinguished from all others, not by one or a few definite properties, but by an unknown multitude of them; the combination of properties on which the class is grounded being a mere index to an indefinite number of other distinctive attributes, and instances Plant, Animal, Sulphur, Horse, &c., as Kinds. Sometimes the properties on which we ground a class exhaust all that it has in common, or contain it all by some mode of implication. In other instances a selection is made of a few properties from a number inexhaustible by us. Where a certain apparent difference between things (though perhaps in itself of little moment) answers to we know not what number of other differences pervading not only their known properties, but properties yet undiscovered, it is not optional but imperative to recognise this difference as the foundation of a specific distinction. He tells us that there are in nature distinctions of Kind, that they are parted off from one another by an unfathomable chasm instead of a mere ordinary ditch, and that our knowledge of the properties of a kind is never complete. See *Logic*, bk. i. c. 7; iii. 22, 25; iv. 6, 7.

OBJ. 1. It is plain, from the above doctrine, that we cannot form our Classes that are Kinds on the basis of attributes, as logic has heretofore directed us to do. We cannot tell what many of the attributes are, nor are we to expect to do so. Yet we have made the group. But how? By connecting the things through some few attributes they have in common, and then, desisting from working by intension, grouping them, as it were, in extension, and postulating that they must have unknown common attributes. Is this procedure reconcilable with Mill's own analysis of the classificatory process?

OBJ. 2. Two criteria are given for determining whether a made class is a Kind. First, that a Kind shall have an *unknown* multitude of properties, not merely derivable from one another, the combination of properties on which the class is grounded being a

mere index to an *indefinite* number of other distinctive attributes. If a large part of these qualities are unknown, and "infinite, so far as we are concerned," what grounds have we for affirming that the Natural Kind possesses them? How can we build a class on an *a priori* supposition? Further, how can we be justified in framing a class upon such a changeable and subjective point as our own ignorance? Why should that enter as a factor into Divisions of Things? Surely the number of properties belonging to a group and our hopelessness of discovering them are two points that are wholly alien to the question of the group-formation. *That*, Mill has told us, is regulated by the quantity and importance of statements concerning the group which shall be applicable to the members. If many and important identical statements can be made concerning such and such things, group them. Good. But what statements can be made about an unknown multitude of attributes? Hitherto we have classed things on account of their recognised resemblances, not on account of their assumed and as-yet-unfound ones.

It is undeniable, of course, that of things agreeing in only one bond of likeness (*e.g.*, colour, shape, specific gravity, &c.), only one general assertion and its corollaries are possible. And that of a Kind, as Horse, or Animal, or Sulphur, many general assertions are possible. But the one class is no whit less a merely intellectual creation than the other. Yet it is juster, it will be said. More useful to us, doubtless, but not more objectively true. More useful to us is what underlies Mill's remark, that it would be a palpable absurdity to investigate the common properties of all white things. But Nature has in reality neither the class White Things nor the class Horse. We made both. Mill, however, would say that in the latter case there is a distinction *answering* to our class. Well, then, so there is, in the former. There are a quantity of things in the universe, alike in point of being white; there are a quantity of things alike in points *a b c*, &c. = Horses. The properties are not found by the Kind, but the Kinds are formed by the properties.

OBJ. 3. The second criterion of Kinds is that they wholly differ from each other, whilst non-natural Kinds differ only in finite and determinate particulars. Roses and Brambles are not natural Kinds, because a rose does not seem to differ from a rubus, or the Umbelliferæ from the Ranunculaceæ in much else than the characters botanically assigned to those genera or those families. All Kinds, Mill says, must have a place amongst classes, but all classes in a natural arrangement cannot be Kinds, for the distinctions of Kind are not numerous enough to make up the whole of a classification. "The great distinctions of Vascular and Cellular, Dicotyledonous or Exogenous, and Monocotyledonous or Endogenous plants are perhaps differences of Kind. The lines of demarcation which divide those classes seem, though even in this I would not pronounce positively, to go through the whole nature of the

plants." But he gives Horse, Animal, Sulphur, Phosphorus, Diamond, Gold, as examples of Kinds. Now are there absolute lines of demarcation, unfathomable chasms, between those classes? They greatly differ from each other; but not wholly. Is it not in reality a question of degree between their likenesses and those which connect Rose and Rubus? Great degree, doubtless, but still only of degree. Is the criterion theoretically tenable?

OBJ. 4. But now let us turn to actualities. Are there in Nature classes clearly marked off from each other, classes to be sought for by us? "*La méthode naturelle,*" wrote Cuvier, "*est l'idéal auquel l'histoire naturelle doit tendre; car il est évident que si l'on y parvenait, l'on aurait l'expression exacte et complète de la nature entière.*" Such was the old view of a natural method, that it was nothing less than a reproduction of a certain orderly arrangement obtaining in the universe, waiting to be deciphered by man. When anomalies cropped up they were, if not too many and too weighty, relegated aside and labelled anomalies; but if too overpowering, it was held that the right basis had not been chosen, or, to use a familiar phrase, a wrong key had been tried. But now there is a tendency to see that so-called anomalies are as legitimate facts as other characters. The old idea was a case of seeing double. There are no natural-made groups behind our groups. It is the endless seeking for this shadow in the stream that has so often misled us.

I may quote some pertinent words of Prof. Newton of Cambridge:—

"The one merges insensibly in the other, as do the race, the species, the genus, and so on. There was a time, and that not long since, when each of these groups was looked upon as a concrete entity having an independent existence, and some men there are who still so regard them; but whether that belief is destined to be perpetuated or restored may well be questioned. It would seem, rather, that each of these groups exists as a group but in the abstract."

Prof. Asa Gray is equally emphatic:—

"The groups which we recognise and distinguish as Genera, Tribes, Orders, &c., are not always, and perhaps not generally, completely circumscribed in nature, as we are obliged to assume them to be in our classification. This might be expected from the nature of the case. For the natural groups, of whatever grade, are not realities, but ideas. Their consideration involves questions, not of things between which absolute distinctions might be drawn, but of degrees of resemblance, which may be expected to present infinite gradations."

Much more might be cited against the theory of "classes in Nature parted by impassable barriers," but I content myself with pointing out how entirely alien to this theory are the experiences of the constructors of natural methods. All who have worked in that field know that the individual is often indeterminable; that the species cannot be fixed; that the qualities of species do not remain constant; that a regular progression cannot be obtained;

that there is not progressive complexity in time or space; that the groups, when formed, are most unequal in size; that they are unequally related; that extinct species (estimated by Sir J. Lubbock at two millions) present a stumbling-block; that so do parasites and abnormal forms; that invariable conjunctions are very few in number; and that even the great fundamental divisions are not irrevocably invariable.

Whewell held that Natural Kinds are determined by a type, around which all individuals which exactly and partially approximate are grouped; that the central nucleus is, as it were, fixed, while the edges fluctuate. But Mill holds that to determine by type would be as sure a way of missing the Kind as arbitrary selection of characters; and that the problem is to find a few definite characters which point to the multitude of indefinite ones. Kinds are classes between which there is an impassable barrier, and we have to seek on which side an object takes its place.

Whewell's type-theory seems to me nearer the truth than Mill's impassable barriers, because it recognises infinite gradations and interminglings; but surely both err in holding that Natural Kinds are to be sought for, not made, by us. Let me not be misunderstood as saying that they depend on the arbitrary choice of the naturalist. He has not an arbitrary choice. His kind or group must be that collocation which admits of the most numerous and most important statements concerning the members. But he does not, I submit, look for "a few definite characters which point to the multitude of indefinite ones". He will, indeed, choose as his diagnosis a few definite characters which point to (are the invariable concomitants of) a number of others, but these not indefinite. And need such a commonplace be added, as that the diagnosis of a class is not necessarily its diataxis?

"The conjunctions of qualities," writes Mill, "constitute the varieties of Kinds." The conjunctions are not fixed by us. But (as in many cases easily adducible) Individuality often is, and so, I believe, is the Kind. Nature does not present us with Kinds, but with Singulars. When we advance beyond Singulars to many individuals or substances forming a "natural Kind," we have made an arbitrary and conventional combination. We formulated the Kind, we selected the archetype, we raised the barriers. Briefly summarised, Nature has only individuals and laws. We recognise intensive connecting bonds of likeness running through things; that is what we find, not demarcated classes. All the class-making, from beginning to end, is our own work, is invention and not discovery. "The General never exists, only the Particular." I am unable to see my way satisfactorily to any other conclusion, yet some doubt lingers with me whether this is the true solution, and, offering it with diffidence, I shall be glad if abler pens than mine will take up the subject. Prof. Jevons talked of Mill's unsatisfactory language, but I am not aware that he ever formulated his own views.