The Orders of Nature: Mineralogical, Botanical and Zoological Classification in the Livre des propriétés des choses

(forthcoming in the *Journal of Medieval and Early Modern Studies*, 52.2 (2022))

The description of living beings—the "ornements" of the earth, as the text calls them—in all their diversity is a central task of Jean Corbechon's fourteenth-century encyclopedia the Livre des propriétés des choses, the translation into French of Bartholomaeus Anglicus's thirteenth-century De proprietatibus rerum, undertaken for Charles V of France. The Livre teems with life: there are individual entries on 38 birds, 113 animals and 192 plants, as well as 103 stones, which are assimilated to living beings through description in terms of gendering, generation and corruption.[1] I will argue that the Livre aims to do justice to the specificities of the natural world and to reveal, by encouraging the formation of analogies, the varied orders of nature. Diverse taxonomies codify and classify creatures, bringing them into groups, but aiming for exhaustivity, the Livre finds natural orders without seeking an overarching order to unite them. Indeed, incompatible epistemologies are frequently juxtaposed in medieval encyclopedias, as Mary Franklin-Brown so powerfully shows.[2] One explanation for tension in this case comes from the dual patterning of medieval articulations of "nature." As

Kellie Robertson demonstrates, two modes shape nature:[3] one transcendent, associated with Neoplatonic and Augustinian writers, whereby nature is mysterious and inscrutable; one immanent, associated with Aristotelian thought, where nature involves regular teleological processes expressed in a language of causes. Or as Alice Lamy puts it, nature is both a "broad, vague and elusive notion" and a "strong ordering principle."[4] Nature has "customs" rather than laws, in Lorraine Daston and Katharine Park's terms.[5] A further relevant factor is the conceptualization of matter. Valerie Allen reveals how matter is restless and changeable in many medieval accounts, settling only temporarily into particular bodily forms. Taxonomical structures can never be rigid, as that would put them at odds with dynamic materiality.[6] Material creation is an interconnected fabric: matter is singular in origin and theory, but plural in its instantiations.

I wish here to adopt a text-centered perspective on these issues, following through a medieval system for conceptualizing nature in full to provide an overview of the structuring ontology, the levels of taxonomy, and the peculiarities of species and their interconnections. I will focus on Corbechon's translation of De proprietatibus rerum, as its manuscripts reconstruct encyclopedic knowledge in magnificent, dedicated illuminations that tightly bind information and beauty, whereas the Latin original was sparsely illustrated.[7] Corbechon also takes such knowledge into

new contexts, diverting the text from its original purpose as a manual for preachers to offer what Jamie Kemp calls "a guide to Aristotle's writings on natural history and the senses."[8] The 45 manuscripts belonged to the great and good: the dukes of Burgundy, Berry and Savoy, as well as Edward IV of England, all owned copies. Corbechon's inventiveness as a translator is already well-documented.[9] He creates in the vernacular a language for sorting the variety of the natural world, and as I shall show, both increases and carefully manages the discursive heterogeneity of the original. He thus offers a much more elaborate account of nature than those found in thirteenth-century French encyclopedias such as Gossouin de Metz's Image du monde, with its quick catalogue of animals, or Brunetto Latini's Trésor, where the bestiary section has nothing like the level of detail found in the Livre. Brunetto is principally concerned with bringing Aristotelian ethics and Ciceronian rhetoric into the mainstream, and tends to moralize or politicize animals. Though he groups animals into larger sets, he does not fully integrate Aristotelian taxonomical thought. The Livre also catalogues the natural world in a way that surpasses bestiaries: Emily Steiner argues that "the medieval compilation of species, the first step toward modern encyclopedism, begins with the bestiary."[10] The Livre, which systematically links animals to material causes and integrates an Aristotelian theory of generation, is another important step on the road; it has not, however, yet been studied in a

way that compares and close-reads its books on living beings. Its influence on understanding of nature, taxonomy and ontology is currently rather obscured by scholarly over-reliance on John Trevisa's English translation of De proprietatibus rerum, which was much less influential than Corbechon's in the Middle Ages (surviving in 8 complete manuscripts), but which has been edited in full, as, more recently, has the Occitan translation of the encyclopedia, whereas only partial editions of the French and Latin works are available.[11]

Participating in medieval discussions about nature and matter, the Livre constantly links and separates bodies via its all-encompassing idea of the propriétés of beings, bringing into French the meaning of proprietas, a technical term in medieval thought that refers to a differentia that serves to distinguish one being, or group of beings, from another. The properties of organisms include their inner principle, material make-up, shape, growth, behaviors, use (for example, in medicine), effects on other organisms, and connections to kin, allies and enemies. The focus on propriétés provides a means of fathoming the principles of diversity in the created world from the most widespread commonalities (the elements) through group manifestations down to individual difference; no individual property is unique to any living being, but its combination of properties does individuate it. The Livre's thought about properties thus

begins with an ontological commitment to the elements—fire, air, water and earth—which are further subdivided into four elemental qualities: heat, cold, moisture and dryness. In human bodies, the elements and qualities interact with the four bodily humors; other beings have simpler humoral systems. Every created body is materially characterized by its combination of elements, qualities and humors. This ontological system also works as a textual principle: the Livre's books move from the divine and the angelic to the human soul and body, before considering time and matter, and the elements, matter's first subdivisions (Books I-X). Next, discussion of each element incorporates the beings belonging to it: air (Book XI) and birds (XII), water and fish (including aquatic mammals and various marine creatures) (XIII), the earth (XIV) with its divisions (XV), then stones (XVI), plants (XVII), and animals (XVIII; Book XIX is something of a miscellany). We move down through the elements to the earth, then up through the levels of sentience for earthly beings, with distinctions also driven by Aristotelian soul taxonomy: humans have rational souls (providing the power of thought); humans and animals have sensitive souls (moving and feeling); humans, animals and plants all have vegetative souls (nutrition and growth). Hierarchies are troubled, however, since the vegetable and mineral worlds prove equally diverse as the animal domain, and all intermesh with each other and with humans. Interconnections come out particularly

strongly in the entries on stones and plants that have anthropomorphic or zoomorphic qualities. Elements and souls thus combine to provide taxonomical and textual structure without ever cutting beings off from one another, since an organism's properties always connect it to others outside its genus.

Distinctions between elements and souls feature in the "general" descriptions that open each book on living beings, preceding individual entries about species (fish only have a "general" description incorporating some examples of species). Further subdivisions, often in terms of bodily morphologies and of the "use" of the animal or plant for humans, follow. I will contend, drawing on anthropological work on taxonomy, that the Livre groups beings with analogous bodies, forming groups such as "birds of prey," with particular focus on movement, protection and nutrition (for animals), and on engendering and gendering (for animals, plants and stones). There are many commonalities, as though nature, "an assembly worker of sorts," repeatedly used the same forms.[12] Yet these groups and forms are not what determines the sequencing of most of the content, since within the Livre's books on living beings, entries are not ordered taxonomically but alphabetically, with names the first thing that individuates species. Etymologies of beings' names offer another gloss on their properties and links to human culture and history, as well as further cross-kingdom connections, since the blanket

of language is thrown over all biological realities. Etymology, I will argue, both furthers the sense of a continuum of beings stressed by material ontology and creates a competing taxonomy which is more logo- and anthropocentric.

The Livre, I hope to show, uses the idea of propriétés to allow for multiple taxonomical impulses and the restless materiality of nature. Taxonomies of souls, elements and bodies provide the focus of my first three sections, on the classification of animals (including birds and fish), plants and stones, before I turn to etymologies and finally to the broader natural network. This order of discussion should bring out how the diversity of properties places beings in groups as well as displaying their individuality, perspective and social world. In the absence of transcendental synthesis, properties make space for demystifying explanations that reveal organizing principles and tributes to the infinite variety of nature.

Animal (Bird, Fish) Taxonomy

Susan Crane demonstrates the dynamic nature of medieval animal taxonomies, contending that bestiaries create "a world view by working out a classification of the world's creatures in all their dimensions—physical, moral, and spiritual."[13] Each creature, in Crane's view, is placed in relation to others, with different classificatory systems forming a discourse shaped by a tension between exhaustive inclusivity and desire

for systematicity. Similarly, in the Livre, knowledge systems overlap, making each animal ontologically complex. In this article, I treat animals, birds and fish together since they have similar taxonomies in the Livre, with nutrition and locomotion key. The initial sorting of creatures follows the element they inhabit, but with some surprising allocations: as Baudouin van den Abeele shows, the book on "birds" includes other flying things: there are four chapters on flying insects and one on bats; around twelve types of insect are also found in the book on animals, including the firefly, which flies.[14] Bees appear as both land-dwelling animals and birds, since they both fly and use their legs, whereas crocodiles and hippopotamuses appear as "fish." But Book XVIII nonetheless opens with a definition of "bestes" [animals] as fleshy, sentient beings (271v), thus including birds ("oiseaux") and fish ("poisons"), before distinguishing inhabitants of air, water and earth.[15] It draws on the account of creation in Genesis to separate out "jumens" [domestic animals], "bestes" [wild animals] and "serpents" [anything that crawls or slithers], including here "vers" [worms, insects and other creepy-crawlies]. "Beste" has a specific meaning at this point in the encyclopedia, but later its use widens to include all animals; similarly, Sarah Kay shows how the term beste, a subcategory of animal in Isidore, gradually subsumes other categories in vernacular bestiaries.[16] Both "serpents" and "vers" are ontologically complex categories that the

encyclopedia goes on to develop in specific entries. At this point, a further subdivision separates animals in terms of their "condicions" [characteristics]: "debonnaires" [friendly], like sheep or cows, or "fieres" [fierce], like tigers or eagles, or "de grant et noble courage" [of great and noble courage], like lions, or "de grant force et malicieux en leurs euvres" [very strong and wicked in their deeds] like wolves and foxes (271v). Crane notes the influence of Isidore on such moralizing categorizations in bestiaries.[17] The Livre mostly eschews moralization, but Isidore remains a powerful influence, taking animal taxonomies beyond the merely physical.[18] The category of domestic first splits into animals for work, for wool or for eating, before other subcategories figure. Some animals are given to us to eat; others for entertainment, like dogs and monkeys; others for medication; and others still to show our fragility.[19] Some are unsuitable for human consumption due to excessive heat or cold, and others would be edible but for their strong odor, like hedgehogs or foxes.

Aristotelian zoology soon dominates.[20] Book XVIII declares that "bestes" possess the sensitive soul, but move and feel to different degrees. The taxonomy of use thus quickly cedes to another generalization and then new distinctions: all animals eat to replenish bodily moisture lost through heat, but some eat meat, others everything, others just plants. Some are nocturnal, others diurnal. Some have great sexual appetite,

others little. Some have blood; some, like bees, have another humor instead. The overall taxonomy does not proceed hierarchically but paratactically, with liberal use of the link "derechief" [what is more]: each new division of the animal kingdom regroups the entire lot, rather than building on the previous distinction. Indeed, Aristotle recognized the failure of dichotomous division, declaring that some animals are social and some live alone, and that this cuts across the distinction between land, sea and air creatures.[21] In the Livre, parataxis reflects the availability of multiple zoological taxonomies, and embodies syntactically the way natural diversity entails the need for a set of concurrent explanatory principles, variously useful for describing different branches of life.

Anthropologists Scott Atran and Brent Berlin, and philosopher of science John Dupré argue for continuities between popular, premodern or nonwestern biological taxonomies and modern western science.[22] They show how scientific taxonomies represent a standardization of what was (and is) known in other frameworks. Popular taxonomies include non-scientific categories, such as fish, which persist in common parlance because they group beings via their ecological roles, morphological frames or topological dispositions. Such classification systems tend to include broad distinctions into kingdoms (such as plant, animal), classes (birds, fish), families (equids, felines) and finally genera gathering sets

of individual species (breeds of horse). According to the work of Atran, Berlin and Dupré, depending on the family or genus at stake, everyday descriptions can be coarse or fine-grained, with classification of the insect world, for example, rather more slapdash in popular thought than in entomology.

In the Livre, individual species have their own entries, though some entries represent genera, that is, groups which divide into individual "maneres" or "especes," both terms approximate to "species."[23] Genera are often binaries, sometimes because domestic beasts also have wild versions (272r), but there are three "maneres" of unicorns (307v) and many of "singes" (308v), for example. Individual species are realities you can perceive relatively quickly, but higher levels of classification result from further intellectual work. The Livre shows how to recognize such higher levels, beginning with kingdoms. The division between animals and plants is here a division into books, with "birds" and "fish" subdivisions of animals (and books of their own). Intermediary groupings function as families, expressed in terms of resemblance and sometimes mentioned in individual entries, as ways of understanding relationships between species, such as here: "le chat resamble au liepart de pies et de tete et de oreilles" (304v) [the cat resembles the leopard in its paws, head and ears]. Such groupings remain fluid: the lynx, for example, resembles the wolf, but has a spotted back like the leopard (302v). Dupré notes that many philosophers and

theoretically-minded biologists have concluded that no universal principle for sorting living kinds can be found.[24] In demonstrating that natural similarities and differences legitimate varied, protean and shifting classifications, the Livre was ahead of the curve.

Elsewhere, lengthy descriptions of families appear. A chapter on "toutes serpens" (sic) [gathering snakes, reptiles and creatures such as salamanders] appears under "a", located there for the "anguis" (279r), a genus of "serpent" defined by their capacity to twist their bodies. "Aspis", also twisty as well as poisonous (281v), "couleuvres", who love the shadows (292v), "dragons", the biggest type of "serpent" (293r), and "visperes" (313r), more venomous fellows, all feature there and have their own entries, sometimes with details of particular species.[25] Other types of "serpent," not foregrounded in the initial taxonomy, also have individual descriptions. The chapter on "toutes serpens" explains that they vary by size, color, numbers of heads, habitat, movement, speed and malignity, each variable being followed by specific examples, of species which are especially large, small, poisonous or otherwise exceptional. Some generalities are mentioned, too: "serpents" are nearly all of cold nature, and most are oviparous. There is some repetition when we come to "s" and the entry on "serpents" (307v), where a general survey is again offered, alongside a cross-reference back to the "anguis"—tension between alphabetical order and zoological

taxonomy thus creates ambiguity about which is the family and which the genus. Indeed, some species are also genera, providing the name of the set of which they are a member. The macro-category "serpent" just about holds together, despite the diverse beings it assembles, and the disputable nature of classifications surfaces in entries such as the "cerastes", considered both an "espece du basilicque" [species of basilisk] and an "espece de serpens" (291v) [species of serpent].

The "vers" is another capacious category, consisting of "petites bestes" [small creatures] engendered in diverse ways, from flesh, plants or corrupt humors, or ovi- or viviparously. Some "poissons" are also engendered from silt (172v), assimilating them to this group, whereas "mouches" [winged insects] remain separate. There are some separate entries on particular "vers," for example, on lice and woodworms. The spider ("araigné"), also termed a "ver," represents a category having "grant diversité" [great diversity], with many "manieres" (281v-282r), whereas there are nine types of another genus of "ver," scorpions (309r). As with "serpents," "vers" is a category made to work hard in the management of zoological diversity. Jean-Marc Drouin charts the broad use of the category "insect" in modern parlance, where insect biodiversity is often still described as "prodigious."[26] The insect clearly remained a thought challenge long after the Middle Ages.

In the Livre, the multiplicity of land-dwelling animals is sorted by a mixture of the opening taxonomy of the book, alphabetical order and further broad groupings as we move through the entries. Creatures are grouped, in that taxonomy, by their adaptation to particular material existences in terms of locomotion, sensation and nutrition. The Livre cautions that similarities can lie below the surface: "aucunes bestes se resamblent en aucuns membres si comme le cheval et l'ome se resamblent en ce que l'un a chair et nerfs aussi comme l'autre mais ilz sont differens en molt de choses" (272v) [some beasts can resemble one another in particular parts, just as man and horse have similar flesh and nerves but they are different in many other things]. In all beasts, however, bones support the body, cartilage prevents bones from damaging skin, nerves join members and allow feeling and movement (there follows a litany of body parts and their common functions across mammal bodies). All beasts that engender have kidneys and a bladder, but not fish and birds as their excess fluids are instead converted into scales and feathers. Analogies are drawn between body parts playing different roles in different species:

> les ongles y sont pour garder les piés et les mains et en aucunnes bestes ilz sont pour deffendre car nature a soutille[ment oeuvré] par son engin de donner a chascune beste aucune garnision pour son

> armer et deffendre de ces adversités et adversaires. Et pour ce les cerfs ont cornes et les sangliers ont grans dens et les lions ont grans ongles dont il usent en lieu d'espée. Et ainsi appert il qui n'a rien aux bestes qui ne leur soit necessaire. Ces autres petites bestes qui n'ont ne cornes ne grans dens ne ongles se sauvent en fuiant par la legiereté de leurs corps si comme il appert du lievre et de moult autres (273r)
>
> [claws are there to protect feet and hands and in some animals they help to [the animal] to defend [itself] because nature worked subtly through its genius to give each beast some means of arming and defending itself against adversities and adversaries. And thus stags have horns and boars have large teeth and lions have claws that they use like swords. And thus it seems that each beast has nothing which is not necessary to it. Some other small beasts, who have no horns or large teeth, save themselves by running away thanks to the agility of their bodies, as you can see in the case of the hare and many others]

This teleology of body parts provides the best grip on zoological variety, linking and separating beings. The parallels here are stressed again in a separate entry on

"cornes," which stresses their "afinité" (292r) [affinity] with "ongles" [nails and claws]. "Nature" is not anthropomorphized in the Livre, as in some medieval accounts, but occasionally plays an agentic role like this, reflecting the Aristotelian conception of form as matter in act and equipping animals for survival in ways that permit their classification.

A series of analogies with unique exceptions then follows: all beasts that engender have eyes, except the mole; all beasts with ears move them, except man; all beasts with horns have cloven hoofs, except the unicorn (the latter is of course a key Old Testament category, dividing clean and unclean animals). Such exceptions show that ordering principles are strong, but not without limits. The patterns thus created act like grammatical principles: you learn the rule and the exception, but here, the exceptions are further proof of the creative power of nature, and do not trouble the rules. Mankind is frequently the central referent in comparisons, but some animal body forms have no human equivalent: "aucunes bestes ont esquailles si comme le limacon et la tortue et le herison a espines et cheval a queue et homme n'a nulles de ces choses" (272v) [some beasts have shells like the snail and the tortoise and the hedgehog has spines and the horse has a tail but man has none of these things]. The anthropocentrism of book's structure is undercut by such comparisons, and the animal world is also frequently

mentioned in Book V, on human anatomy, for points of comparison. Comparative anatomy was a key thirteenth-century mode of thought and its rendering here stresses that you cannot understand humans without understanding their fellow creatures.

"Poissons" (fish) are described in Book XIII, using the same variables. They are first divided into those living both on land and in water, such as "les cocodrilles et les chevaux d'eaue" (172v) [crocodiles and hippopotamuses], and those that dwell only in water, which category is divided again into sea- and freshwater inhabitants. Once more, bodily adaptation to environments is a key classificatory principle: sea-dwelling fish have tougher "escailles" (scales), for example. Some fish bear the names of land beasts such as "les chiens et les loups de mer qui mordent et blecent les autres poissons" (172v) [sea-dogs and sea-wolves which bite and wound other fish]. Kinships with land animals here come from similarities in feeding, but the resemblance between horse and hippopotamus is also stressed, again establishing varied continuities between animal life-forms in different habitats. Though some specific species are mentioned, this remains a kit for making a taxonomy of aquatic living beings, with the work left to readers.

Taxonomical work is carried out more fully in relation to birds. The introduction to Book XII suggests an initial division between those who like and dislike human company.

Voices provide another mode of classification within entries: birds might have sweet or horrible voices, and their calls carry different meanings. Apart from “mouches” [winged insects], and griffins, all “birds” have two feet, but the feet differ:

> tous oiseaulx ont .ii. pies de leur propriété aussi come home mais en divers oiseaux ilz sont de diverses fourmes car les oiseaux de proye ont les piés fors et les ongles aigus et les doiz separez et divisez l’un de l’autre pour mieulx prendre et retenir leur proye (153r)
>
> [birds have the property of having two feet, like mankind, but in different birds they take different forms, since birds of prey have strong feet and sharp claws and their toes separated from one another to better catch and hold their prey]

Birds of prey are thus a recognized family. The eagle entry adds: “les oiseaulx aux ongles crochus ont la veue ague pour veoir leur proye de loing” (154r) [birds with hooked claws have sharp eyesight to see their prey from far away], suggesting that body morphology entails the need for specific senses. Then, within the family, birds of prey are differently equipped. The falcon is “plus armé de hardiesse que de ongles et ce que nature ne lui donne en grandeur de corps elle lui recompense et en hardiesse et en grant courage” (155r) [better armed with boldness than claws and what nature does not give it in body size it makes up for in boldness and great

courage]. Here nature has a providential role, but the Livre generally prefers to describe the suitability of bodies to tasks, rather than the process of making them. Thus other birds are said to have bodies adapted to swimming, such as ducks with their large undivided feet. The capacities of particular body forms create family groupings: birds of prey use one of the affordances of feet; ducks and their ilk another.

In some Livre manuscripts, images assist in the formation of analogies. The codices vary: some have ordered grid images for animals and birds; elsewhere creatures are depicted in their habitats; elsewhere still, birds (but not animals) have individual images. Plants and stones are not illuminated in detail in Livre manuscripts, but only in "general," whereas fish are not depicted. In Paris, Bibliothèque nationale de France, français 135 and 136, a two-volume version of the Livre, the book on birds opens with an image with lots of birds, before individual images of birds; Kemp argues of this version that "the diminishing size and increased specificity of the subject and chapter description highlight the nested structure of the encyclopedia and the hierarchical relationship between genera and species."[27] The Chantilly manuscript works in a similar way, featuring a grid of four birds as well as a few individual pictures of birds. In the grid, the birds in each column face the same way, in profile and in similar poses, highlighting pertinent similarities and

differences (see fig. 1). The griffin (bottom left) is the exception that confirms the rule: "le griffon a .iiii. pies et a la teste et les elles semblables a l'aigle et du remenant du corps il est semblant au lion" (161r) [the griffin has four feet and has a head and wings similar to the eagle and the rest of its body is like a lion], says the entry, making the griffin a crossover between land-dwelling animal and bird. The difference between eagle feet, suitable for catching prey (top left) and swan feet, made for swimming (top right) is visible, distinctions between feet being a key way of identifying sub-groups of birds, whereas the cockerel (bottom right), defined by its voice, looks ready to crow. Such grid images are a common tool in encyclopedic manuscripts. Easily extensible, presentable and readable, grids suggest order. Faith Wallis therefore rightly argues for commonalities between grid images and tables.[28] And Lucy Freeman Sandler sees the grid as "a visual itemization of individual elements" which belong as equals to a larger group, their equality stressed by the equal size of their container.[29] Here, schematic illustrations facilitate comparison, reducing bird life to almost geometrized, two-dimensional shapes. As in modern scientific visualizations, information is selected and rendered in "manageable dimensions."[30] For animals, too, a grid of four creatures highlights a common morphology based on having four legs (see fig. 2). Differences of feet are visible, and the unicorn's and the horse's positions opposite each other

(bottom left and bottom right), invite comparison and imply kinship. The lion, lording it top left, is described as "roy" (300v) [king] of the beasts in its entry, whereas as the stag (top right) is of course primarily defined by its antlers (290v). There are more extensive grids of animals in other Livre manuscripts, most notably in Amiens, Bibliothèque municipale, Ms. 399, which features 37 animals; Steiner notes that other Livre manuscripts feature illustrations of the most "basic" bestiary animals, such as the hedgehog, lion, bear, ape, panther, boar, dog, stag and horse.[31] These depictions highlight the belief that zoological morphology can be made systematic, though much diversity has of course first been filtered out.

A different mode of illustrating birds opens other possibilities for classification. Paris, Bibliothèque nationale, français 9140 uses habitat as the main organizing feature of its image of birds [fig. 3]. Domesticated birds such as the hen and peacock are in the foreground, in the yard of a house; other peacocks sit on the wall with magpies; ducks and geese are in the water in the middle of the image; two storks are nesting in the chimney top left as another flies towards them; many other birds, harder to identify, are on the roof, in flight, in the water in the distance, or on different types of landscape. Kemp argues that a similar image in Paris, Bibliothèque nationale, français 135/6 involves "flooding the composition and filling the space," with a variety of

representational features highlighting "the variety and bounty of the list."[32] Another beautiful image in Paris, Bibliothèque nationale, français 9140 does the same for the animal kingdom.

Such illustrations bring out how each animal resembles the last in its own unique way, its manner of belonging to a group individuating it. Atran notes how zoological classification seeks the "ecological distinction that marks a morpho-geographical gap in the readily perceptible local economy of nature."[33] Or as Lamy puts it, nature gives things "self-expression, ontological identity, and a specific place within the world's matter".[34] Bodies are individually equipped, with parallels in modes of adaptation, sometimes glossed here by equivalence between animal bodies and human tools. Thus the lion uses its claws like a sword; the ram has horns for a shield. This tendency extends to the behavioral: the stork defends its nest like its "heritaige" (158v) [heritage], and with birds more broadly, males remain loyal to their partners and protect them, "aussi comme par amour de mariage" (152r) [as though through marital love]. Such language is well explained by Steiner, who argues that animal ethics replaces bestiary symbolism in encyclopedias: animals no longer symbolize religious truths but instead model good or bad behavior toward their own and other species. She notes claims in the Livre such as that dormice are devoted to their parents (instead of symbolizing sloth, as in bestiaries) and pigs are good neighbors to other pigs (instead representing filth and

sin); such descriptions, she contends, come from compilation and the need for "a descriptive language that can account for similarities and differences among [animals] as well as between animals and human beings."[35] Indeed the Livre, in its text and images, encourages the formation of analogies as the path to deciphering the codes of created life.

Plant Taxonomy

Initially, the Livre relegates plants below animals, as they lack "vie sensitive" (224r) [sensitive life], referring to Aristotle's sensitive soul. They have only "vie et vertu croissant" [growing life and power], or Aristotle's vegetative soul, by which they pull humor up from the earth for their nutrition. Life in plants is "obculte" [hidden], whereas in animals it is "manifeste et parfaite et complete" [manifest and perfect and complete]. The encyclopedia admits the possibility of challenge to Aristotle's model, noting the argument that plants are more perfect than beasts because they produce no waste, before declaring this opinion false because plants cannot move voluntarily and lack a "fourme determinée" (224r) [fixed form], which animals have, alongside eyes, ears and other body parts without vegetal equivalents.

This relegation of plants continued in modern metaphysics, where plants were described in terms of privation or as part of a passive, aestheticized "nature." Much environmental studies scholarship now works against this,

developing philosophies of plants, and seeking to understand them as communicating and sensitive entities.[36] And despite the opening declaration, the Livre's discourse on plants goes in the same direction. Not only is the number of plants described impressive—192—but plants have complex bodies: their roots, bark, leaves, boughs, twigs, blossoms, flowers, and fruit all have different properties.[37] Plants may only have one humor, but they interact with the four elements and the four qualities. The plant reproduces by "une vertu seminale par quoy il a puissance de engendrer de soy son semblable et de conserver et garder son espece" (224r) [a seminal power which gives it the ability to engender from itself its kind and to conserve and protect its species]. Vegetal reproduction is complex, requiring the right conditions and the involvement of parents: "la terre est la mere et le souleil est le pere des arbres et des plantes" (224r) [the earth is the mother and the sun is the father of trees and plants]. The moon plays a role, too: plants planted in the full or new moon become ill; if they recover, they bear worm-ridden fruit (226v). Plants are descended from their own kind, as are animals, but other agents participate.

Animal and plant bodies have further analogies, since plants have "vaines" (224v) [veins] through which humor flows, before becoming the substance of leaves, fruit and branches in the "ventre" [belly]. "Escorce" [bark, chaff or other outside surface] does the job of "cuir" [skin], whereas leaves shelter

fruit, which in turn guarantees propagation. Roots work as mouths, taking in nourishment, whereas “neux” [knots] are like “ners” [nerves], connecting everything up (224v). The trunk resembles “entrailles” (225r) [intestines], but some call it the “cuer” (225r) [heart] because it houses the “vie croissant.” Leaves and fruits can be superfluous parts (“superfluitez”, 224v) that fall like nails and hair in beasts. Some entries cover particular parts of plants, stressing common functions across different species. Thus the entry on roots describes how its form relates to its role: “la racine est tortue pour soy plus fermement fichier en terre” (258r) [the root is twisted in order to more firmly fix itself in the ground].

Within the plant kingdom, trees and herbs are distinguished, although the “arbre” serves too as a paradigmatic plant that blurs the distinction between the general and the particular.[38] There is a mini taxonomy of wine, as well as a section on “arbres aromatiques,” which picks out culinarily- and medicinally-useful plants, with a further distinction about the location of the aroma: in the bark, the fruit, all over, and so on. Plants vary in size, shape and strength thanks to their humor, which spreads to varying degrees. Some keep their leaves; others lose them. In a pattern familiar from animal taxonomies, parataxis dominates here, and certain of the differentiations that create implicit families also recur: wild versus domestic is again key

opposition, as is beauty versus ugliness, and perhaps more surprisingly, gendering also figures frequently:

> en tous arbres il y a malle et femelle dont le malle est plus espois et plus dur et a plus de branches et en est le fruit meilleur et plus sec et meilleur a mengier et si a plus de diverses fueilles que n'a la femmelle (226r)
> [of all trees there are male and female [versions] with the male thicker and harder with more branches and better fruit which is dryer and better to eat, and also with more diverse leaves than the female]

The gender binary expressed here allows for a focus on engendering. Some plants are engendered by seeds, others "sont engendrez par eulx de la commotion des ellemens" (225v) [reproduce spontaneously thanks to movements of the elements], and others still multiply thanks to grafting, said to be easier if the plant is "semblable" (225v) [similar] to the host, suggesting plant kinship. In all this, living beings of different orders are being pulled into relationships of analogy.

Within individual entries, there is differentiation of species of the same genus, and the separation of parts and products. Thus the "amandier" [almond tree] "porte double fruit" (226v) [bears two fruits]: the sweet variety is edible; the bitter kind useful for medicine, whereas there are different medical uses for the seed, root and flower of the "anet" [dill]. Michael W. Twomey notes that Bartholomaeus

tends not to include the landscape needs of plants, instead untying them from their environments.[39] But plant adaptation to living conditions is sometimes described, such as here: "il croist aussi de telles feves en Egipte mais elles sont plainnes de espines et pour ce les cocodrilles les fuient et nen osent aprouchier en doubtant que elles ne leur facent mal aux yeux" (240r) [such beans grow in Egypt which have many spines and so the crocodiles flee them and dare not approach, fearing that they will hurt their eyes]. Placed in such interspecies situations rather than mute landscapes, plants in many ways rival the complexity of animals.

Stone Taxonomy

Stones, in the Livre and in other medieval discourses, are living things. Despite being "simplement insensibles et sans ame" (208v) [simply insensitive and without soul], stones are not passive, fixed or unchanging, but possess powers, movement and history. The Livre dismisses the idea that stones have a soul, and Jeffrey Jerome Cohen explains why this notion might have needed refutation: stones display many of the attributes of life, including growth.[40] Albertus Magnus argued that stones are soulless, but that they do have forms, which are more than just shape or structure, since they give stones the power to act.[41] Certain stones appear in bestiaries, assimilating them to animals. And in the Livre, like all matter in the sublunar world, stones are generated and subject to corruption. Stones

are engendered “en vainnes de la terre” (208v) [in the veins of the earth]. Book XIV presents stones as the earth’s internal ornaments—animals and plants being its external ornaments—and picks out landscapes where stones abound. In Book XV, on the earth’s regions, Arabia and India are named as lands of great lithic production. Animals and birds also produce stones: for example, lynx urine engenders a specific stone called “ligure” (216v); in a crisscross of references, this is also mentioned in the entry on the lynx (302v). Toads, vultures and mollusks are amongst those creatures whose bodies produce precious stones. Stones are thus linked by their genesis to other lifeforms. They vary greatly, too, with different compositions and celestial influences, but share certain “proprietez communes” [common properties]: “elles sont froides de leur nature et seches et fermes et dures et pesantée et par leur pesanteur elles tendent tousjours en bas” (218v) [they are cold in their nature, dry and hard and heavy, and through their weight they always tend downwards]. [42] The earth is their natural place, though they do not consist of earth alone, but require water to cohere.

Matter always comes from somewhere, and in this system, there is no engendering without gender. The gendering of stones prepares for their anthropomorphism, and their relationship to the animal and human world. Examples of gendered stones include the “echites”:

> y a male et femele et pour ce les treuve l'en deux et deux dedens les nis des aigles et sans ces pierres les aigles ne puent faire leurs faons. Le male de ces pierres reluist un pou et est dur et la femelle est mole (214r) [there are male and female forms and for this reason you find them in pairs in the nests of eagles and without these two stones the eagles cannot breed. The male of these stones is hard and glows a little and the female is soft]

Animal use reveals the power of this stone, which can make women give birth quickly, too, or miscarry if used for too long. The stone's effect on pregnant bodies stems from the fact that it becomes pregnant: "ceste pierre en a une autre dedens soy aussi comme une femme grosse" (214r) [this stone has another stone inside it, like a pregnant woman]. Similarly, the stone called "pionite" is described as feminine since it "concoit […] et met hors de soy une autre pierre semblable a lui" (219r) [conceives and pushes out of itself another stone like itself]. It too helps pregnant women. The analogy here helps readers to envisage the containment of one stone in another, but also makes space for medical epistemologies within the Livre's overall ontology, and shows how affinities of matter cut across categories of animal, vegetable and mineral.

"Gemmes" [precious stones], a subgrouping of rare stones that glow brightly, are described in an entry that becomes a

further taxonomy, sketching the variety of their provenance, before bracketing off dark precious stones under the label "orbes" and warning that they are sometimes more powerful than their shiny colleagues (215r-215v). Aside from gender, color is often the first division of stone genera into species. Thus the "achates" is described as a stone with different colors corresponding to varied origins and uses. One type, black with white veins, is used by enchanters to bring storms and reveal things seen in dreams. Another, found in Crete, has the color of iron, helps you avoid perils and makes you strong and eloquent, whereas the one with red spots like blood, found in India, acts against thirst and venom, and cures blindness (211r).

A final key taxonomical distinction is stones versus metals, though both figure in one alphabetical sequence. As Julie Singer notes, Aristotle says little about metals, and Isidore and Albertus Magnus are the main sources here.[43] Metals are sometimes presented alongside stones as products engendered by the earth, but elsewhere as the products of stones, found within the veins of mountains (176v). Metals have their own taxonomy: thus "vif argent et souffre sont la matiere et le commencement de tous metaulx" (210r) [quicksilver and sulphur are the prime matter and origin of all metals]. Sulphur is a "vainne" of the earth defined by the predominance of fire in its complexion (221v); it has several types, explaining the varied metals that can be made with it.

Silver, on the other hand, contains quicksilver, although, confusingly, quicksilver is also a "maniere" of silver (210r), a mix of water and a particular type of earth that requires lead and sulphur to cohere. If the levels of this taxonomy appear blurred, the entry on gold nonetheless displays its heuristic value in distinguishing the properties of metals:

> la matiere dont l'or est fait et les aultres metaulx c'est delié souffre rouge et vif argent et y a plus de souffre qui est terrestre en l'or que de vif argent qui participe plus a la moisteur de l'air. Et pour tant l'or est plus ferme et plus pesant que n'est l'argent (209r)
>
> [the matter of which gold and other metals are made is a fluid of red sulphur and quicksilver and there is more sulphur which is terrestrial in gold than there is quicksilver which participates more in the moisture of the air. And for this reason gold is harder and heavier than silver]

The idea of "participating" in the moisture of the air relates to notions of affinity between substances. The properties of metals, like those of other bodies, can be explained via relationships to the elements, with sulphur and quicksilver intermediary substances like elemental qualities and humors in the body. The continuum of beings thus extends across categories of animate and inanimate, stretching from the animal to the metallic.

Etymologies

The Livre's overarching ontology of elements and souls often disappears during individual entries, which are ordered alphabetically, albeit often in relation to Latin names, and loosely, with alphabetization generally extending only to the first letter. Alphabetical order can be intellectually arbitrary, but etymologies, which open most entries, help establish ontological connections between things and their names. Isidore is the second most common source (after Aristotle) in the Livre's books on living beings, and his etymologies gather species within a totalizing model whereby names indicate fundamental truths. In Isidore and in second-family bestiaries, Adam names the animals according to their nature, and Crane casts this as a taxonomic act, distinguishing species from species, and human thinker from object of thought.[44] Etymologies are thus anthropocentric as well as logocentric. John Henderson notes that etymology has an "all-embracing semiotic power" in Isidore, showing how heterogeneous systems interact in a "conveyor-belt of constantly unfolding explication."[45] Kay, on the other hand, argues that etymologies disclose a thing's origin and its allegorical meaning, extending to Latin or Greek, or to the beginning and end of scriptural time.[46] Etymologies connect domains and create confluences.

The Livre makes great use of etymologies, drawing on many of these potentials, but downplaying their role as symbolic

principles or routes to allegorical truths in favor of natural-historical data.[47] Yet Franklin-Brown suggests a clash between natural history and etymology in encyclopedias, stemming from "a deeper incompatibility between structures of intellectual authority."[48] And, since it is a translation, this is even more so in the Livre, where discursive heterogeneity reigns: the orders in nature (ontological, morphological) sometimes jar with the (linguistic) orders we use to understand it. My examples here display some of the creativity and plasticity of the use of etymology. The boar, notably, is filed under "a" in the book on animals, likely to preserve the linguistic order that shaped the Latin original, and a link to Latin explains the boar's nature: it is called aper in Latin because of its "aspreté" (227v) [toughness]. Latin provides the underpinning kinship between linguistic and life forms there, but Greek confirms the lion's status since its name comes from the Greek for "king" (300v), and Greek explains the defining bodily feature of the stag: "cerf" from Greek ceraston, for "horn" (292v). But in the book on birds, the eagle comes first because it is "roy" (153v) [king] and its name is attributed to the "aguesté" [acuteness] of its sight (154r). In these examples, alphabetical order and the order of species importance combine neatly with physiognomy.

Yet elsewhere, etymologies sit awkwardly because Corbechon leaves links unexplained. Garlic's name is explained thus—"ailet est ainsi appellé pour ce qu'il puet selon

Ysidoire" (228r) [garlic is so called because it stinks according to Isidore]—with no connection made between alium and olere, which motivates the name in Isidore.[49] The encyclopedia just continues quickly, saying garlic can counter horrible odors. The same missing link phenomenon occurs with the fir tree:

> sapin est en latin appellé abies et est un(e) arbre ausi nommé pour ce que en croissant il va plus hault que nul autre arbre. La nature de sapin est que il n'a point de humeur terrestre si comme dit Ysidore (227r)
>
> [the fir tree is called abies in Latin and it is a tree called that because it grows higher than any other tree. The nature of the fir tree is that it has no earthly humor as Isidore says]

Abies is close to abire (to move away from) in Latin, but Corbechon offers no gloss, instead enlisting Aristotle to confirm Isidore's etymology via an argument about matter: the fir tree's light matter is propelled upwards by its heat, making it grow straight. The etymology remains obscure, with physical properties prioritized. With salt, there are alternative etymologies: salt "est ausi appellé pour ce que il sault hors du feu quant on le gette car il fuit le feu combien que il soit de chaude nature" (221v) [is so called because it jumps [sault] out of the fire when thrown in because it flees fire even though it is of hot nature], though others attribute its name to the "souleil" (221v) [sun, Latin solum] because it

is made from sea water dried by the sun. These etymologies do not compete but rather together provide two modes of tying salt into elemental ontology and of explaining its characteristics and origin. In these cases, the material dimension takes priority over the linguistic.

Elsewhere, Corbechon invents his own etymologies, such as for the bird called chauan. Here etymology creates an additional familial link to the cat, wrongly attributed to Isidore:[50] "le chauan est un oisel qui hue et crie par nuit et pour ce est il ainsi appellé car il a le visage et aucunes condicions du chat et hue de nuit moult laidement sicomme dit Ysidoire" (157r) [the chauan is a bird which howls and cries at night and thus it has this name since it has the face and some of the characteristics of the cat and howls at night in a very ugly way, as Isidore says]. Etymology also tightens cross-kingdom relationships in the case of the onyx, which "a en soy couleur mellee aussi comme l'ongle d'une personne et pour ce est elle appellee oniche en grec qui est a dire ongle en latin" (218r) [has mixed color like the nail of a person and for this reason it is called oniche in Greek which means "nail" in Latin]. Corbechon thus fully exploits etymology as a means of linking diverse bodies.

Etymologies feature most prominently when they are connected to histories. The laurel, for example, is alphabetized via Greek:

> laurier est en grec appellé dalphnus et pour ce est il ci mis entre les arbres dont les noms se commencent par la lettre de .d. Le laurier est dit et nommé de loenge car antieurement ceulx qui avoit victoire en bataille et a qui on en donnoit la loenge si estoient couronnez de branches et de fueilles de laurier et pour ce jadiz on l'appeloit laudier si comme dit Ysidoire (236r)
> [the laurel tree is called dalphnus in Greek and that is why it is here placed with those trees whose names begin with the letter "d." The laurel is called and named for "praise" because long ago those victorious in battles and who were praised were crowned with laurel branches and leaves and the tree used to be called laudier as Isidore says]

Why keep the Greek name for alphabetical order, when the Latin name has an etymology? One reason is the laurel's complexity: Pliny is cited as identifying thirteen "manieres," including one dedicated to Jupiter and one to Apollo, and the entry contains the story of the Roman emperor Octavian's wife:[51] an eagle dropped a white hen into her lap with a bough of laurels. She planted them and woods called "le bois triumphal" (237r) [the forest of victory] grew. Emperors henceforth wore laurels after victories. But the entry also narrates laurel's use by the biblical Rebecca, wife of Isaac, who wore a crown of laurels to solicit prophetic dreams and scare away false images. Hence the plant has a place in history that includes,

but goes beyond, the Romans. The overdetermination afforded by etymology incorporates multiple histories without prejudicing the system, as it becomes clear that human cultures emerge from varied interactions with nonhuman beings. All in all, a tactical approach to etymology is taken, foregrounding the complexity of links between human languages, nonhumans and matter.

Nature's Broader Network

The encyclopedia's books on living beings open with logocentric classification and references to great authorities, but there remains space for competing knowledges. This section concerns the ontological complexity of beings and connections which remain inexplicable in terms of the encyclopedia's overarching taxonomy, which focuses on anatomical analogies, reproduction, motion and nutrition. They emerge in individual entries that suggest a multispecies social world, at times via accounts of the use-value and cultural significance of animals, plants and stones to humans, but also their diverse properties, not all of which appear in their interactions with humans. And ultimately, I show how the anthro- and zoomorphism of plants shows how properties create connections across kingdoms.

Stones have perhaps the most diverse uses. Allen notes that while processes of petrification are explainable in terms of Aristotelian causality, the powers of individual stones are

observable only in their effects.[52] The stone called "dyadocque," used to communicate with demons, loses its power on contact with a dead human body (213v), but generally, it is stones that affect humans; Robertson argues that rocks are active participants in shaping human mental realities.[53] The stone "gagates" [agate], for example, is emblematic of hidden mineral powers: "se une pierre si rude fait tant de merveilles c'est argument que pour aparence de la face nul ne doit estre desprisié quant on ne scet quel vertu il a par dedens (215v) [if such an ugly stone does many so wonders, that is an argument for not despising anyone for their outward appearance when you do not know what powers are inside]. The lithic world thus contains moral lessons for the human one, and agate has further powers: it detects virginity, protects against ghosts and illusions, fights dropsy, liver and stomach problems, and softens hard things. Such properties are presented as Christianized marvels: thus on gems, the Livre cites Isidore saying "nul ne doit doubter que Dieu n'ait mis grant vertu en elles" (215r) [no one should doubt that God gave them their powers]. Stones are wondrous, involving causation outside of the elemental etiological system, but their powers are not ungodly.

Hidden powers are not restricted to stones. The properties of many plants are explained in terms of effects on human bodies, often via elemental qualities or hardness or softness, or else the power to dissolve, which serve as

correctives to corporeal imbalances. For example, "l'ail […] a molt de propriétés bonnes et mauvaises car il est composé de diverse vertus" (228r) [garlic has many good and bad properties since it is made up of many powers]. Garlic, which breaks down humors, thus aids those who cannot urinate. Yet plants are not of solely medicinal value. The laurel tree protects land against lightning and its leaves "gueurissent de la pointure des mouches et de toutes enfleures et si gardent les livres et les robes avec qui on les met des dommages des vers" (236v) [heal insect bites and all inflammation and protect books and clothes with which they are stored from moth damage].

Some plants combine several properties and sets of relationships. Thus "lierre est composée de choses contraires et pour ce elle euvre en contraires choses" (238r) [ivy is made up of contrary things and so it works in contrary things]. It purges the head, calms the stomach, and helps the deaf, as well as possessing other human resonances: "les poetes se souloient couronner de yerre en signe qu'ilz avoient vif engin aussi comme yerre est toujours vive et verte" (237v) [poets used to crown themselves with ivy to show that they had lively invention just as ivy is always alive and green]. The ministers of the Roman god of wine Bacchus were crowned in it, too, as were Alexander the Great's victorious soldiers. Ivy's etymologies then bring further connections to humans and animals. Thus ivy is called "yerre" because "elle se aert aux

arbres et aux murs" [it clings [se aert, sounding something like yerre] to trees and walls], or because "elle fait les chevres avoir moult de let quant elles la menguent duquel let elles nourrissent leurs faons qui en latin sont appellez edi de quoy elle est appellee edera" (237v) [it makes goats produce lots of milk when they eat it, with which milk they feed their young, which in Latin are called edi, whence ivy is called edera]. But ivy's historical importance now appears strange relative to some of its other behaviors. Ivy

> rompt les murs et les sepulchres ou elle se prent. L'ombre en est froit et moult nuisant et est amé des serpens et est a merveilles comment jadis on la tenoit a si grant honneur car l'odeur de ses fueilles en est puante et la saveur en est amere (237v)
>
> [breaks walls and tombs where it grows. Its shade is cold and harmful and beloved of snakes and it is a marvel that people used to honor it so much since its leaves smell horrible and it tastes bitter]

There are many other links between the plant and serpentine worlds: snakes lurk in certain plants; others can be used to enchant snakes, or since the cure often lies near the poison, to treat snake bites. But ivy in particular appears as a bundle of relationships to the human, animal and material worlds.

Plants and animals have a broad range of interactions. In the case of "diptannus" [dittany], humans learned from an

animal how to use a plant: "la femelle du cerf moustra premierement sa vertu car elle mengue ceste herbe pour mettre hors de son corps ses faons plus legierement" (236v-237r) [a deer first showed its power because she uses it to give birth more easily]. Animal use of plants is not, however, always shared by humans. The boar "quiert une herbe que on appelle origane et la mache par la vertu de laquelle ses dens sont confortees et aguisees" (278r) [looks for a plant called origane and chews it, through which its teeth are strengthened and sharpened]. It also "frote ses costes encontre un arbre pour endurer et se couche en la boue et puis s'en va se couchier au souleil pour mieulx soustenir les cops de ses adversaires" (278r) [rubs it sides against a tree to harden [them], as well as rolling in mud and letting it dry in the sun to better defeat itself from its enemy's blows]. The encyclopedia here allows for animal perspectivalism, a theory recently reactivated by anthropologists Philippe Descola and Eduardo Kohn. Animals perceive different affordances of the environment, since their bodies are different: a cliff looks like a palace to a pigeon, and carrion smells sweet to a vulture.[54] Or here, what looks to us like mud looks to a boar like a perfectly serviceable suit of armor. In incorporating such ideas, the Livre goes beyond a model of difference that focuses on bodies to allow for different minds.

Social relationships also define animals. The raven "het le renart" (158v) [hates the fox] above all beasts, whereas

the crow is its "ami" (159r) [friend] and fights other animals on its behalf. Elephants and dragons fight out their own animal feud. These are not just metaphors for human relationships: animals are individuated by their names, by their bodies, and again by their social relationships. The basilisk, for its part, has a fatal stare but can be defeated by a weasel thrown in its nest; this apparently random combination, outside of any material explanation, is then glossed providentially: "car Dieu qui est pere de toutes choses n'a rien laissé sans remede" (285v) [God, who is father of everything, left nothing without a remedy]. Even though the basilisk is poisonous, its cinders are useful against poison and speed the transmutation of metals. The web of interrelationships between creatures and substances adds new layers of animal identity, beyond the overall structuring ontology.

Plants too have a rich social life, with varied relationships to animals.[55] The plant "celidoine" [celadine] is so named: "pour ce elle fleurist quant les arondes viennent car celidon en grec c'est arunde en latin" (235v) [since it flowers when the swallows come, since celidon in Greek means "swallow" in Latin], or because it helps young swallows see. Here, etymology underscores the fact that plants and animals are mutually-constituting beings. It is not clear whether the "celidoine" or the swallow came first, nor does it matter. At times, such relationships stretch to plant zoomorphism. The

plant known as “serpentine” “est ainsi appellée pour ce que elle est tachiée de diverses couleurs aussi comme une couleuvre et est une herbe que les serpens heent et redoubtent” (237r) [is so called because it is marked with diverse colors like a snake and it is a plant that serpents hate and fear]. It also:

> a la fleur de couleur de pourpre ou verte comme la gueule d’une serpent et du moien ist une langue ague et noire et ronde comme langue de serpent et au milieu de la fleur se lieve un chief plain de semence grosse et ronde qui est verte au commencement et puis devient rousse quant elle commence a meurer (237r)
>
> [has a purple or green flower like the mouth of a serpent and from the middle there grows a thin, black and round tongue like the tongue of a serpent and in the middle of the flower there is a head full of thick round seed which is green to begin with and then becomes red when it starts to mature]

This seed has great medicinal powers, and the plant’s interactions with the animal kingdom are defined by its animal-like form, a phenomenon explicable in terms of Giorgio Agamben’s theory of “signatures,” marks which displace concepts across ontological domains. The concept emerges from Agamben’s interest in theories about hidden therapeutic virtues, whereby resemblances provide clues to hidden remedial powers. Thus Agamben cites Paracelsus: the plant “euphrosia,”

which has a marking in the shape of an eye, helps heal the eye by becoming eye.[56] The plant's appearance links a particular body part, a therapeutic virtue, and the disease itself. Or in the case of the "serpentine," whose name connects plant and animal kingdoms, to the creature it repels, whereas the "afinité" (292r) [affinity] of horns and nails explains the medicinal use of the former for problems with the latter. Signatures provide clues to hidden empathies of matter across domains of being.

The encyclopedia incorporates this plant zoomorphism, but how far does shared being extend? There are anthropomorphic animals, such as "fanes" [fauns], "satires" [satyrs] or other "bestes monstrueuses et contrefaites" [monstrous or deviant animals], who have human faces but lack reason and speech. "Cenophalles" [dogheads], "cicloppes" [cyclopes], and people without heads, are amongst other types mentioned (297r). Such creatures are marked as immoral, and despite their partly human bodies, separated off from the human via their position in the book on animals. Yet they remain thinkable, whereas plant anthropomorphism causes more headaches, as the example of the mandrake shows. It has sweet-smelling "pommes" [berries] on its leaves and:

> les latins l'appellent pomme de terre et les grieux l'appellent mandragore qui est tout un et les poetes l'appellent antropomeres pour ce que elle a la racine a la fourme de un homme ou de une femme (249r)

> [Latin speakers call it pomme de terre and the Greeks call it mandragore which is one and the same and the poets call it antropomere because its root has the shape of a man or a woman]

Gender again provides a way of thinking about species variety: "il est .ii. maneres de ceste herbe dont l'une est femelle qui a les fueilles comme une lettue et les pommes dessus; l'autre est malle qui a les fueilles semblables a une bette" (249r) [there are two types of this plant with one female which has leaves like lettuce and berries above; the other is male and has leaves like beet]. But anthropomorphic tendencies here associated with poets and marked as unnatural: "la racine de ceste herbe n'a pas de sa nature la semblance de homme et de femme mais ce est fait par art et par engin" (249r) [the root of this plant does not naturally have the appearance of a man or a woman but this is done through art and trickery]. Here the encyclopedia incorporates and holds at bay bestiary material. In Philippe de Thaun's bestiary, the mandrake has male and female physical forms, and emits a fatal cry when plucked. As Emma Campbell argues of Philippe's bestiary, the mandrake is a figure of the tree in earthly paradise, symbolizing temptation and mortality, but also stimulates fertility for elephants. It has "ambivalently curative and fatal properties" and its "fatal cry communicates the irreversible mortal consequences of humanity's uprooting from Paradise, an association reinforced by the male and female

forms of its roots."[57] The Livre relates the plant to elephant reproduction in its entry on the elephant (296r), but here mentions only human conception, and there is no link to Adam, Eve or paradise. It instead enlists a chorus of authorities: "dit Constantin et Dyascorides et le Plateaire et Plinius que ceste herbe quant on la prent deuement dispose les maries a concevoir qui par devant estoient trop seches et trop chaudes" (249r) [Constantine and Diascorides and Platearius and Pliny say that this plant, taken properly, makes wives conceive who before were too dry and too hot]. Here the elemental ontology of dryness and heat normalizes some properties (stimulation of conception), whereas others (anthropomorphism and moral meaning) are either bracketed off or simply excluded. Yet, in the Livre's account, strange rituals for cultivating the mandrake are necessary:

> ceulx qui arrachent le mandragore se gardent bien que le vent ne leur soit contraire et font .iii. cercles de une espee au tout l'erbe et puis l'attendent a deffouir jusques au souleil couchant et par ce il appert que ils tiennent que ceste herbe est de molt grant vertu (250r). [those who uproot the mandrake are careful that the wind is not against them and they trace three circles with a sword on the ground and then wait to dig it up until the sun is setting and by this you can see that they think that this plant is of great power]

Elemental ontology is confirmed and challenged: this anthropomorphic plant has medicinal uses explicable via shared materiality, but the ritual looks like a remainder of discordant knowledge systems; it is left unexplained and presented only as testament to the plant's powers. The Livre is shaped by such movement between explanation of properties in terms of elemental qualities and acknowledgment of inexplicable characteristics and practices. An ontological scaffolding prioritizes material commonalities that link beings, but also makes space for details that remain unreconciled with the text's principal models of causation; the overall taxonomy therefore keeps turning out to be more inclusive than restrictive.

Conclusion

The Livre promises totality and systematicity in its rhetoric and design, with the idea of "properties" providing an overarching framework for reading the natural world, and its text and images together provide varied explanatory idioms for a new, vernacular reading public. Reconciliation of authorities, reworking of existing material about the natural world—especially Isidore, Aristotle and bestiaries—and management of French's relationship to Latin and other languages all play a role in creating taxonomies. Elements and souls provide an initial handle on diversity, before etymologies anchor beings in language, culture and history,

and interrelate them. Then individual entries, in their myriad details, show how nature is participative, allowing identities to extend across domains and always making room for shared features and interactions. Human use might be foregrounded, but animals, plants or stones are never ontologically exhausted by it, with each species representing a unique bundle of properties and connections to other bodies, habitats, materials and beings. The Livre shows how nature's abundant variety entails the need for a diverse set of epistemologies, with propriétés proving a very powerful way of doing taxonomy, one that allows for diverse relationships of analogy and interconnection. Corbechon's translation captures—and takes into new contexts—the great subtlety, plasticity and range of medieval taxonomic thought.

Captions

Fig. 1: Chantilly, Bibliothèque du château MS 339, fol. 151v: grid of birds. Cliché CNRS-IRHT © Bibliothèque du château de Chantilly (musée Condé).

Fig. 2: Chantilly, Bibliothèque du château MS 339, fol. 271r: grid of animals. Cliché CNRS-IRHT © Bibliothèque du château de Chantilly (musée Condé).

Fig. 3: Paris, Bibliothèque nationale de France, français 9140, fol. 211r: birds in their various habitats.

[1] These are the figures identified by Bernard Ribémont in his partial translation of the Livre: Le Livre des propriétés des choses: une encyclopédie au XIV^e siècle (Paris: Stock, 1999).

[2] Mary Franklin-Brown, Reading the World: Encyclopedic Writing in the Scholastic Age (Chicago: University of Chicago Press, 2012).

[3] Kellie Robertson, Nature Speaks: Medieval Literature and Aristotelian Philosophy (Philadelphia: University of Pennsylvania Press, 2017).

[4] Alice Lamy, "Defining Nature in Medieval Cosmological Literature: The Founding Principle of Contradiction in the Cosmographia of Bernardus Silvestris, the Anonymous Placides et Timéo, and the Image du monde of Gossuin of Metz," Journal of Medieval and Early Modern Studies, 49.3 (2019): 457-78, at 458.

[5] Katharine Park and Lorraine Daston, Wonders and the Order of Nature, 1150-1750 (New York: Zone Books, 1998), 14.

[6] Valerie Allen, "Matter," in Inhuman Nature, ed. Jeffrey Jerome Cohen (Washington: Oliphaunt, 2014), 61-77, at 67.

[7] Heinz Meyer, Die Enzyklopädie des Bartholomäus Anglicus: Untersuchungen zur Uberlieferungs und Rezeptionsgeschichte von "De proprietatibus rerum" (Münich: W. Fink, 2000) offers the definitive guide to manuscripts of the Latin original and all translations.

[8] Jamie Kemp, The Mind's Eye: Visualizing Encyclopedic Knowledge in the Later Middle Ages, PhD dissertation at the University of Victoria (2014), https://dspace.library.uvic.ca/bitstream/handle/1828/5773/Kemp_Jamie_PhD_2014.pdf?sequence=1&isAllowed=y, at 58.

[9] Bernard Ribémont, "Jean Corbechon, un traducteur encyclopédiste au XIVe siècle," Cahiers de recherches médiévales, 6 (1999), 75-98; Joëlle Ducos, "Le Lexique de Jean Corbechon: quelques remarques à propos des livres IV et XI," in Bartholomaeus Anglicus, De proprietatibus rerum: texte latin et réception vernaculaire, ed. Baudouin van den Abeele and Heinz Meyer (Turnhout: Brepols, 2005), 101-15.

[10] Emily Steiner, "Encyclopedic Beasts," in Book of Beasts: The Bestiary in the Medieval World, ed. Elizabeth Morrison (Los Angeles: J. Paul Getty Museum, 2019), 237-44, at 239.

[11] On the Properties of Things: John Trevisa's Translation of Bartholomaeus Anglicus's "De proprietatibus rerum": A Critical Text, ed. M.C. Seymour et al., 3 vols (Oxford: Clarendon Press, 1975-88); for the Occitan, Elucidari de las proprietatz de totas res naturals, ed. Cyril Patrick Hershon and Peter T. Ricketts (Egletons: Carrefour Ventadour, 2018); for the Latin: De Proprietatibus Rerum: Volume I (Prohemium, Libri I-IV), ed. Baudouin van den Abeele et al.; Volume VI (Liber XVII), ed. Iolanda Ventura (Turnhout: Brepols, 2007). For the French, Ribémont, Le Livre des propriétés des choses, gives a translation of extracts.

[12] Lamy, "Defining Nature," 460.

[13] Susan Crane, Animal Encounters: Contacts and Concepts in Medieval Britain (Philadelphia: University of Pennsylvania Press, 2013), 72.

[14] Baudouin van den Abeele, "Barthélemy l'Anglais et Jean Corbechon: enquêtes sur le livre XII, De avibus," in Bartholomaeus Anglicus, De proprietatibus rerum: texte latin et réception vernaculaire, ed. Baudouin van den Abeele and Heinz Meyer, 245-66.

[15] I have transcribed and translated all quotations from Chantilly, Bibliothèque du château MS 339, which was given to Jean, duke of Berry, by his secretaries in 1404. The manuscript has been digitized at Bibliothèque virtuelle des manuscrits médiévaux, Institut de recherche et d'histoire des

textes (2013), http://bvmm.irht.cnrs.fr. All references are folio numbers.

[16] Sarah Kay, "Before the Animot: Bêtise and the Zoological Machine in Medieval Latin and French Bestiaries," Yale French Studies, 127 (2015): 34-51, at 48.

[17] Crane, Animal Encounters, 69.

[18] See Isabelle Draelants, "Encyclopédies et lapidaires médiévaux: la durable autorité d'Isidore de Séville et de ses Étymologies," Cahiers de recherches médiévales et humanistes, 16 (2008): 39-91.

[19] This first section is translated in Bestiaires du Moyen Age, ed. Gabriel Bianciotto (Stock, 1980).

[20] On the medieval reception of Aristotelian zoology, see Aristotle's Animals in the Middle Ages and the Renaissance, ed. Carlos Steel, Guy Guldentops and Pieter Beullens (Leuven: Leuven UP, 1999). On Bartholomaeus's sources, see M.C. Seymour et al., Bartholomaeus Anglicus and his Encyclopedia (Aldershot: Ashgate, 1992).

[21] Aristotle, History of Animals, I.i, 488. See Ahuva Gaziel on the difficulty in deciding the order of differentiae in Aristotelian taxonomy: "Questions of Methodology in Aristotle's Zoology: A Medieval Perspective," Journal of the History of Biology, 45 (2012): 329-52. Richard A. Richards argues that Aristotle sought principles for describing nature rather than a totalizing framework: Biological Classification:

A Philosophical Introduction (Cambridge: Cambridge UP, 2016), 44.

[22] Scott Atran, Cognitive Foundations of Natural History (Cambridge: Cambridge UP, 1990); Bernt Berlin, Ethnobiological Classification: Principles of Categorization of Plants and Animals in Traditional Societies (Princeton: Princeton UP, 1992); John Dupré, Humans and Other Animals (Oxford: Clarendon, 2002).

[23] Species and genus of course have particular meanings in scholastic thought, but I use them in their modern senses here as a way of articulating the levels of the Livre's classification system. As Jerry Stannard notes, "in medieval nomenclature, genus, species, varietas, and forma were used interchangeably": "Albertus Magnus and Medieval Herbalism," in Albertus Magnus and the Sciences, ed. James A. Weisheipl (Toronto: Pontifical Institute of Mediaeval Studies, 1980), 355-77, at 366n.

[24] Dupré, Humans and other Animals, 4.

[25] As John Henderson notes, this is a complicated entry in Isidore, with 30 named types: The Medieval World of Isidore of Seville (Cambridge: Cambridge UP, 2007), 150.

[26] Jean-Marc Drouin, La Philosophie de l'insecte (Paris: Seuil, 2014), 2.

[27] Kemp, The Mind's Eye, 43.

[28] Faith Wallis, "Visualizing Knowledge in Medieval Calendar Science: A Twelfth-Century Family of 'Graphic Glosses' on

Bede's De temporum ratione," in The Visualization of Knowledge in Medieval and Early Modern Europe, ed. Marcia Kupfer, Adam S. Cohen and J.H. Chajes (Turnhout: Brepols, 2020), 291-326.

[29] Lucy Freeman Sandler, "Religious Instruction and Devotional Study: The Pictorial and the Textual in Gothic Diagrams," in The Visualization of Knowledge in Medieval and Early Modern Europe, 429-48, at 436.

[30] Michael Lynch, "The Externalized Retina: Selection and Mathematization in the Visual Documentation of Objects in the Life Sciences," in Representation in Scientific Practice, ed. Lynch and Steve Woolgar (Cambridge, MA: MIT Press, 1990), 153-86.

[31] For a reproduction and commentary of the Amiens grid, see Steiner, "Encyclopedic Beasts," 243, and see 251 for an example of the "basic" selection.

[32] Kemp, The Mind's Eye, 157.

[33] Atran, Cognitive Foundations, 29.

[34] Lamy, "Defining Nature," 476.

[35] Steiner, "Encyclopedic Beasts," 240-1.

[36] Notably, Emanuele Coccia, La Vie des plantes: une métaphysique du mélange (Paris: Payot & Rivages, 2016); Michael Marder, Plant-Thinking: A Philosophy of Vegetal Life (New York: Columbia UP, 2013); Jeffrey Nealon, Plant Theory: Biopower and Vegetable Life (Stanford: Stanford UP, 2015); Peter Wohlleben, The Hidden Life of Trees (Glasgow: HarperCollins, 2013).

[37] Similarly, Coccia develops separate philosophies of the seed, the leaf, the flower, and so on.

[38] Berlin notes that in indigenous taxonomies, plants, trees, herbs and vines are often distinguished (Ethnobiological Classification, 164-5); Christian Hünemorder notes that Isidore has two groups of plants: trees and herbs, but that Thomas de Cantimpré has the "aromatic" category, too: "Aims and Intentions of Botanical and Zoological Classification in the Middle Ages and Renaissance," History and Philosophy of the Life Sciences, 5.1 (1983): 53-67.

[39] Michael W. Twomey, "The Exemplary Environment of Bartholomaeus Anglicus," in Reading the Natural World in the Middle Ages and the Renaissance: Perceptions of the Environment and Ecology, ed. Thomas Willard (Turnhout: Brepols, 2000), 71-88, at 75.

[40] Jeffrey Jerome Cohen, Stone: An Ecology of the Inhuman (Minneapolis: University of Minnesota Press, 2015), 212.

[41] Albertus Magnus, Book of Minerals, trans. Dorothy Wyckoff (Oxford: Clarendon Press, 1967), 2.1.1-4.

[42] Allen notes how earthiness and heaviness elide for Albertus Magnus: "Mineral Virtue," in Animal, Vegetable, Mineral: Ethics and Objects, ed. Jeffrey Jerome Cohen (Washington: Oliphaunt, 2012), 123-52, at 128.

[43] Julie Singer, Representing Mental Illness in Medieval France: Machines, Madness, Metaphor (Cambridge: D.S. Brewer, 2018), 13-31.

[44] Crane, Animal Encounters, 90

[45] Henderson, The Medieval World, 24, 28.

[46] Kay, Animal Skins and the Reading Self in Medieval Latin and French Bestiaries (Chicago: University of Chicago Press, 2017), 31-33.

[47] Draelants, "Encyclopédies et lapidaires médiévaux," 56.

[48] Franklin-Brown, Reading the World, 222.

[49] This etymology is explained in the Occitan version: Elucidari de las proprietatz de totas res naturals, 424.

[50] van den Abeele, "Barthélemy l'Anglais," 258.

[51] The Chantilly manuscript mentions Caesar here, but the story relates to Octavian"s wife in Pliny, Suetonius and Cassius Dio: see Marleen B. Flory, "Octavian and the Omen of the 'Gallina Alba'," The Classical Journal, 84.4 (1989): 343-56.

[52] Allen, "Mineral Virtue," 136.

[53] Robertson, "Exemplary Rocks," in Animal, Vegetable, Mineral: Ethics and Objects, ed. Jeffrey Jerome Cohen (Washington: Oliphaunt, 2012), 93-123, at 106.

[54] Philippe Descola, Par-delà nature et culture (Paris: Gallimard, 2005), 326-27; Eduardo Kohn, How Forests Think: Toward an Anthropology beyond the Human (Berkeley: University of California Press, 2013), 95.

[55] Pierre Dubuis notes how common plant amities and enmities were in medieval discussions of vines: "La vigne, ses amis et ses ennemis végétaux: témoignages antiques, médiévaux et modernes," in Le monde végétal: médecine, botanique,

symbolique, ed. Agostino Paravicini Bagliani (Florence: Galluzzo, 2009), 157-73.

[56] Giorgio Agamben, The Signature of All Things: On Method, trans. Luca D'Isanto with Kevin Attell (New York: Zone, 2009), 36-37.

[57] Emma Campbell, "Sound and Vision: Bruno Latour and the Languages of Philippe de Thaon's Bestiaire," Romanic Review, 111.1 (2020): 128-50, at 146.