Aristotle's teleology is not susceptible to simple analysis. He has, if not several teleologies, at least one that operates by different logics along different dimensions. So the main tasks in clarifying his teleology are to analyze these several sub-teleologies and, more crucially, to plot their relations, especially their relations of priority and dependence. Since Aristotle's teleology is his primary way of explaining nature, this will map as well his primary strategies or routes of explanation. I think that most accounts of Aristotle's teleology have both failed to recognize this diversity, and have focused their attention away from the dimension—of ends and explanations—that's primary. It is only after we have identified and mapped this primary dimension, that we will be in a position to assess his teleology.
I mean by Aristotle’s teleology the way he explains by ends.¹ I will develop the main dimensions of his teleology as relations to the other three causes or explainers.² That is, an end [E] always explains through or by means of one of Aristotle’s other three kinds of explainers, the matter [M], or the source of motion [S], or the form [F]. Each end is the end of—and explains—some matter, some mover, or some form; with and through this paired principle, the end explains in turn the many particular explananda (including properties and events). There are thus three kinds of ends, which I will refer to as hyletic, kinetic, and eidetic.³ Since ends explain only with one of these three paired principles, these kinds are exhaustive.

In each case Aristotle’s end explains through the paired explanatory principle: an end depends on a matter, a moving source, or a form to complete (mediate) its explanations. (In part, it completes the explanation by explaining—in a different way—the end itself, we’ll see.) Equally, the matter, source, or form depends on the end: its explanation isn’t complete, without adding how it is itself explained by its end. For example, a certain portion of matter M explains many things, but it only fully explains them by being itself explained by an E; it’s this E that ‘ultimately’ explains all those things. So Aristotle’s three teleologies work through (or with) the material, efficient, and formal causes.⁴ There is also an order of priority among these three teleologies: the ends of forms explain the ends of matter and of movers.

My aim is to map these interlaced teleologies,⁵ and then to use them to treat some large questions.

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1 We should hear ‘teleology’ as offering a telos/end as a logos/reason—i.e. using the end to explain. I’ll restrict ‘teleological’ to this explanatory role, and use ‘telic’ for other aspects of ends.

2 Throughout, I will use ‘cause’ as a stand-in for Aristotle’s ‘aitia’—which I take to mean ‘explainer’. Familiarly, Aristotle thinks there are four kinds of these, of which it is the ‘source of motion’ that is closest to our notion ‘cause’.

3 After hulê/matter, archê tês kinêseôs/source of motion, and eidos/form.

4 In each case there is an interplay between the E and the M or S or F; it’s in this back-and-forth that Aristotle’s explanations run.

5 More broadly, my project is to see how Aristotle’s philosophy looks, as organized around his teleology; I treat his other main ideas in their relations to this explanatory project. And, of course, I try to make this teleology conceptually precise and concrete.
about Aristotle’s position, as it emerges. This map, drawn with moderate detail, will show the real structure of much of Aristotle’s system—running through his physics, biology, and psychology to his ethics and theology. We see all of this better when we see it as a single system of explanations by ends.

About this system our most general questions will be: 1) How, exactly, does Aristotle think these teleologies ‘explain’? In particular, how is this explanation by ends related to the ‘causal explanations’ our own science uses? 2) In what sense does he think that these ends are ‘good’? Are all Es good, and if so are they good because they’re Es, or Es because they’re good? And what kind of goodness do they have—for example are they ‘good for’ the things that are for them, or are they ‘good in themselves’? 3) What evidence and arguments does he give for attributing particular ends, and for his teleology in general? And, of course: are there good arguments either for or against his position, regardless of whether he saw them? How, in particular, does the position stand with respect to our own scientific conception of the world?

So my projects are to specify the 1) explanatory and 2) normative logic of Aristotle’s teleology, and then to assess its 3) defensibility, so understood. I will argue that there are two quite different ways we can interpret the logic of his explanation by ends. These identify different ultimate or highest ends in his telic system. Since his teleology both explains and gives value from those ultimate ends to all his others, this difference in how we identify those ends shifts the overall justification of his teleology. It gives him quite different arguments, and ones that have very different explanatory force for us today. I assess the strengths and weaknesses of these two ways he might mean his claims about ends.

But I begin—in the first section—with some methodological work: I offer a certain model for mapping these teleologies, and introduce several formal properties that ends may have.6 The body of this paper will then use this model to lay out Aristotle’s teleologies, with special attention to those formal

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6 I have adapted important features of this model from Fine 1992, to which I am much indebted. My early sections, in effect, explore how far Fine’s handling of Aristotle’s matter-of-relation can be adjusted to handle his end-of-relation. I touch on some differences in notes below.
properties, and to address the guiding questions just raised.

§1. **Background: schematizing ends.** I will model each of these three ‘dimensions’ of ends as a network composed of linear sequences or chains of members. These are causal chains, but 'final causal' chains (not efficient or material or formal causal). Each link in one of these chains is a pair of some x—any existent, for now—and its end [telos] E. Aristotle mainly calls this E the *for which* [hou heneka]; he treats it as x’s principal cause [aitia], or explainer. I will depict this relation by

\[ x \rightarrow E \]

—to be read as 'x for E'. For example: an eye is for seeing.

It should be borne in mind that explanation runs oppositely to the arrow, from E to x. For convenience of reference, we can treat these arrows as running 'upwards', from explanandum (explained) to teleological explanans (explainer), the final cause; explanation then runs ‘down’ through these links. Chains are formed by attaching links on bottom or top: either by positing x's end as itself an x + 1 with an end (E + 1) of its own (seeing is for knowing), or by positing x as itself the end (E - 1) of some x - 1 (the eye is the end of the eye-part). It may help to diagram this:

\[
\begin{array}{c}
E + 1 \\
\uparrow \\
E = x + 1 \quad \text{knowing} \\
\uparrow \\
x = E - 1 \quad \text{seeing} \\
\uparrow \\
x - 1 \quad \text{eye} \\
\uparrow \\
\text{eye-part}
\end{array}
\]

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7 I aim for consistency in rendering Aristotle's Greek; I introduce these equivalences as we go (flagging them by bolding the English). I list these regular translations in the Glossary at the end.

8 This, much more than *telos*, is Aristotle's chief teleological term. If we can hear the bare word 'for' with this teleological weight, I think it's a better rendering of *heneka* than is 'for the sake of', which carries too cognitive connotations. See Gotthelf 1987b, 205n.2 on the term. Another of Aristotle’s teleological terms is *charin*, used like *heneka*.

9 What seeing is really for will be a major issue below; we’ll also look more carefully at some hyletic and kinetic details of Aristotle’s physiology for the eye. So these examples are only hypothetical.
In joining links in this way, it's natural to assume transitivity in the 'end-of' relation we are modelling by these chains. If E explains x and x (as an E - 1) explains x - 1, then E explains x - 1; and, to put it in the opposite direction, if x is explained by E and E (as an x + 1) is explained by E + 1, then x is explained by E + 1. So knowing explains the eye-part.

Now it might seem that this model of 'chains' is unapt, because x will often have (for Aristotle) many—even uncountably many—ends, and will often be the end of similarly many x - 1s. So it seems that links might radiate from it in many directions both above and below, and form not so much chains as a web, with a geography intricate and daunting to map. This will be all the more so on our assumption of transitivity, since it seems x should have links not just with E, but with E + 1, E + 2 and so on.

We can reduce the chaos by bearing in mind a few simple and formal ways Es can be related to xs. Aristotle has reasons for special interest in Es that stand in these relations to their explananda. It will help in our study of his teleology to notice just where these formal relations do and do not hold. Let’s get these relations clearly in view.¹⁰

First, we will want to know whether an end explains its x ‘directly’. This is the question whether the E is ‘proximate’ for the x—in parallel to the proximate matter and proximate efficient cause already noted by interpreters.

[P] An end E is proximate for x iff (E explains x and) there is no other end E' which E explains, and which in turn explains x.

Again a diagram, of what proximacy rules out:

```
NOT:  E
      ↑
   E'
      ↑
   x
```

¹⁰ Asking these questions about the formal structure of Aristotle’s teleological claims helps us sharpen our view and vocabulary in preparation for our main issues.
(Notice that the definition also rules out a case in which E explains x both through E’ and also directly; this isn’t proximate for x either.\textsuperscript{11}) We’ll see that Aristotle recognizes proximate ends in each dimension of his teleology.\textsuperscript{12} The full detail of his explanations will need to supply them.

Second, we have an even stronger interest in the question whether an E is ‘complete’ for the x—such that x isn’t also explained by independent ends.\textsuperscript{13}

\textbf{[C] An end E is complete for x iff (E explains x and) there is no other end E’ which explains x, unless E’ either explains E, or is explained by E.}\textsuperscript{14}

We can diagram what an E’s completeness allows, and excludes:

\begin{center}
\begin{tikzpicture}
    \node (E) at (0,0) {E'};
    \node (E') at (1,0) {E};
    \node (x) at (0,-1) {x};
    \draw[->] (E) -- (E');
    \draw[->] (E') -- (x);
    \node (E''') at (2,0) {E'};
    \node (E''') at (3,0) {E'};
    \node (x) at (2,-1) {x};
    \draw[->] (E') -- (x);
    \draw[->] (E'') -- (x);
    \node (x) at (3,-1) {x};
    \draw[->] (E') -- (x);
    \draw[->] (E'') -- (x);
\end{tikzpicture}
\end{center}

(What’s ruled out is that x is explained also by some E’, unless the latter is explained by E, or explains x only through E.) So E 'gathers' any more proximate ends of x, by explaining them, and is itself the sole channel by which any less proximate ends explain x.

We have an obvious, prima facie preference for explainers that are complete; this seems a feature of our general method. And I think Aristotle has this preference too. He gives evidence of recognizing complete ends merely in speaking of 'the end' of some x. That general aim we noted, to make his explanations converge upward, prompts him to seek complete ends. We’ll see how he pursues completeness in those several teleological dimensions.

\textsuperscript{11} I will largely simplify below by not considering cases in which ends explain both directly and indirectly.
\textsuperscript{12} Met 1044b1-2 advises to look for proximate [\textit{engutata}] causes of all four types.
\textsuperscript{13} Here 'complete' means something different than does Aristotle's \textit{teleion}, which it is sometimes used to translate. I translate the latter 'final', and discuss it below.
\textsuperscript{14} Note that we're here concerned only with an E’s completeness as an end, not as a (generic) explainer; we’ve seen that an E explains only along with some matter, mover, or form, i.e. along with one of these other \textit{aitiai} or explainers.
A third question to ask about an E is whether it is ‘dedicated’ to its x—i.e. explains only x.

[D] An end E is dedicated for x iff (E explains x and) there is no x’ which E also explains, unless x’ either explains x, or is explained by x.

So there is no x' that E explains 'independently' of x. Again a diagram of ways an E can and cannot be dedicated:

```
     E
    ↑  ↑  E
   x'  x  
  ↑  ↑ / \
 x  OR  x' BUT NOT:  x  x'
```

So x is as it were a funnel through which all of E's explanations run. Whereas the condition of completeness forbids branching upwards, dedication forbids it downwards.

We'll see that Aristotle does not, for the most part, think of ends as dedicated. He wants, after all, to gather explananda under fewer explainers, so that he looks for a teleology with strong downward branching.\(^{15}\) However, his exceptions—and seeming exceptions—to this preference (for nondedicated ends) are interesting; where dedication and completeness are both required (or both occur) in forming links of xs and Es, we would have linear chains.\(^{16}\)

There are three further questions to pose, about the structure of Aristotle's teleologies, as we map them.

a) Does 'circularity' occur, in these chains of xs and Es?\(^{17}\) Can E, the end-cause of x, have x as its own (perhaps non-proximate) end-cause (as an E + 1 or E + 2...)? Again a diagram, of the most direct case

\(^{15}\) Indeed this is a strength of teleology; by contrast, in hyletic explanations more parts explain fewer wholes.

\(^{16}\) Fine 1992 examines whether Aristotle's matter-of relation can be 'linearized'. The analogue to the linear composition he sketches, would be a 'linear teleology', in which each x has at most one E as its proximate complete end, and is itself a proximate dedicated end for at most one x - 1. But I think our explanatory project gives us a reason not to linearize but 'hierarchize' Aristotle's end-of relation, i.e. to pursue completeness, but not dedication.

\(^{17}\) Aristotle allows (a kind of) circularity in kinetic or efficient causality; e.g. APo 95b38-96a7 (the example is the water cycle).
Such loops back would, it seems, refute our notion that the system of ends is a hierarchy: if the 'tops' of some chains lead to their 'bottoms', the very use of up-down to model teleology would be improper.

b) We must also watch for a kind of circularity within the proximal end-of relation itself, i.e. within a single link. Can E be x itself, i.e. can x be its own end-cause? Or can such ‘reflexivity’ be excluded? In particular, when Aristotle treats activity as an end-in-itself, does he mean not just that other things are done for it, but that it is done for itself—a further teleological step from x back to itself, now as an end? What would be the nature of the transition here? How can anything be the (teleological) cause of itself? If we find Aristotle allowing such reflexive ends, we must examine how he handles these puzzles.

c) And we must ask, in each of his teleologies, which if any of its ends are ‘final’, in the sense that they are the top ends of chains, not themselves explained by any higher ends. Aristotle calls such ends ‘teleion’ [e.g. NE 1097a27]. He argues there must be such ends. These ‘first causes’ in his teleological explanations will obviously be of special interest.

Now of course, all of these formal questions are just devices for making clear the structure of Aristotle’s teleology, which in turn we want in order to ask our contentful questions about it. My claim, then, is that Aristotle distinguishes three basic networks of such chains of ends, each running through a different dimension of teleological space. Each of these locates the for-which with respect to a different one of the other causes, so that we find a material, an efficient, and a formal teleology, in which ends explain some matter, motion, or form. But these different dimensions also meet at nodes, at which they themselves are linked teleologically, one serving as end for the others. By mapping these relations, we put ourselves in

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18 Met 994a8-10 stresses that chains of ends, as of the other causes, cannot go on without limit, 'walking for health, this for happiness, happiness for something else, and so always one thing for another'. Also 994b9-16.
position to consider what such ends are 'highest' or final for Aristotle. And we ready ourselves to examine those key questions about Aristotle’s overall view.

§2. The ends of matter and motion. Let's start by looking at the two dimensions I will argue are secondary, before turning to what they depend on. These dependent teleologies—which I think most recent accounts have focused on—plot the end-directedness 1) of part to its whole (material or functional or 'hyletic' teleology), and 2) of moving cause to its goal (efficient or generative or 'kinetic' teleology). Together, they will constitute one main axis of explanation, which Aristotle associates with 'necessity'.

These two systems of end-causes are major themes in Aristotle—they’re the respective topics of Parts of Animals and Generation of Animals, seemingly his chief biological works. And each has been supposed the basic point of his teleology. So, I think most recent analyses of it have been either functional (in taking the ends primarily as wholes that explain the 'synchronic' composition of structured parts)\(^\text{19}\), or kinetic (taking ends primarily as results or effects of 'diachronic' processes—motions—effected by 'movers')\(^\text{20}\). The former analyses treat Aristotle's heneka—his teleological 'for'—as the performance of a role in a system, the latter as an episodic production of a result. Each aligns Aristotle with a different contemporary analysis of teleology.

Aristotle thinks these teleologies converge at their 'tops', in their highest or final end: for both, this is the mature and active organism. (Or, it is the organism as form or soul or substance, we’ll see.) But they explain different classes of things as 'for (the sake of) this end; more crucially, they describe these as 'for' it

\(^{19}\)Nussbaum 1978, 76: 'Aristotle's position ... is closest to the one defended by Boorse and Cummins' (referring to Boorse 1976 and Cummins 1975); she puts it: 'An animal or plant is an organic whole, a complicated system of interrelated capacities... to promote and maintain the mature functioning of an organic system of that sort, and/or to perpetuate the system beyond the individual life by reproduction.'

\(^{20}\)Gotthelf 1987b, 213: 'the core of Aristotle's conception of final causality' is his notion of an 'irreducible potential for form', explaining the generative stages in development to 'a mature, functioning organism'. He argues [238ff.] that the functional teleology—the part's being for the whole organism—is dependent on that primary sense: being-for depends on coming-to-be-for. (I don't adopt Gotthelf's own term 'dynamic' for this teleology, because that word has wider scope: both matter and mover are dunameis—which I translate 'powers'—for Aristotle, the term applying as much to parts' functional powers, as to e.g. a seed's generative power.)
along different dimensions, the first structural, the second temporal and 'generative'. As explanatory strategies, they agree on the explainer, but apply it to different explananda: the organism-in-action explains, as an end, either why its parts are organized as they are, or why its generation proceeded through the stages it did. Both of these teleologies can be usefully modelled as hierarchies of chains.

**a. Hyletic teleology.** In Aristotle's compositional or hyletic\(^{21}\) teleology, the x is some matter that is 'for'—and so explained by—an E. Aristotle’s principal account of this teleology is in *Parts of Animals.*\(^{22}\) We need to specify this x and E, and the nature of the ‘link’ between them. For the most part—and this is how I’ll render them—Aristotle treats them as related synchronically, such that the matter is concurrent with its E. However he sometimes presents them diachronically, by identifying the matter as the raw materials that (temporally) precede a substance, and out of which it is made.\(^{23}\) I focus on the former, and shunt the latter aside into his ‘kinetic teleology’ below.

Initially it seems that the hyletic E must be the matter’s *function* or *ergon*: what it does, that contributes to the system it belongs to.\(^{24}\) But I think this is only an approximation, since it takes in only half of the point of such teleology. That function must itself be understood in relation to the system to which the matter belongs; the part is *for* its function, only as its way of being *for* the whole. (Aristotle distinguishes these as the *hou heneka* and the *hôi heneka.*\(^{25}\)) So it's the working system served by x that is its full

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21 (From *hulê*, Aristotle's word for matter.)

22 This work’s purpose is not to say what the parts are, but to give their (teleological) causes; so PA 646a8-12 and GA 715a1-3, 782a21-23.

23 E.g. PA 646a35-b2: ‘So matter and the genesis must be earlier in time, but the substance and form of each [thing] [must be earlier] in account.’ Also b6-10. The two senses may be distinguished at Met 1044a23-25.

24 PA 645b19-20: ‘the parts [are for] the functions towards which each is natured [pephuken]’. GA 716a23-25: ‘organs are needed for every functioning, and the organs for powers are the parts of the body’. Lloyd 1992, 162: ‘parts are in general for the sake of their functions’.

25 I.e. the object of *heneka*/*for* is in either the genitive or dative case. DA 415b2-3, 415b20-21; Phy 194a35-36; Met 1072b1-4. We'll see that the contrast also applies within the kinetic teleology.
functional or compositional E, while the function itself is an intermediate or internal E*. And this whole is
suited—as the function is not—to be itself an x + 1 that is in turn explained as 'matter-for -(the-sake-of)'
some more encompassing whole (as we need, if we're to form chains). So we should understand the 'hyletic
end' as the whole in which x is a functional part. At the 'top' of the hyletic teleology, the highest such Es
are the organisms themselves.

At this teleology's 'bottom', its lowest xs are the four elements, earth/water/air/fire. More precisely,
it is specific occurrences of earth etc. in some organism, that are ultimately explained: it's this earth that has
its E* as its role in the organism, not earth-in-general. This lowest matter is also—as Aristotle says at PA
646a15-18, 'to say it better'—the basic 'powers' [dunameis] that differentiate the elements, dry/wet/cold/hot;
these are 'matter of the composite [sunthetôn] bodies'. Here we find a parallel ambiguity in the matter, to the
one we found in matter's end. Just as there he identified the end as both its function (E*) and the whole (E)
it serves, so here he ties the matter to an intermediate x*: the **power** of the matter or part (x) to perform its
function.26

We can treat this 'power' as another part of the internal structure of each link between a hyletic x
and E. So we can represent the full structure of a link in the hyletic teleology this way:

**Matter for End:** \[\text{x [part]} \rightarrow \text{x* [power]} \rightarrow \text{E* [function]} \rightarrow \text{E [whole]}\].

Again we must bear in mind that although hyletic explanation ('from matter') runs from left to right, the
teleological explanation ('for end') trumps this, and runs from right to left.

We’re interested here in the way the whole explains its parts, as their end. But we should bear in
mind that Aristotle also thinks that the parts, as matter, explain the whole. So it’s both the case that the
water in the eye explains how it can see, and that this function in the whole eye explains why it has that

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26 See PA 646b19-24 on how different organs need to be made of (matter with) different powers.
part. The most important thing matter explains, is how the whole can do what it does; since the whole also explains the matter, explanation is reciprocal. Still, this relation is not really symmetric for Aristotle, and I return to this below.

In mapping this hyletic teleology, we can draw our criteria for proximacy etc. from the matter-of-relation. So, to take the easy cases first, transitivity clearly holds, whereas reflexivity and circularity do not. (If x is matter for y and y is matter for z, then x is matter for z. But nothing is matter for itself, nor for anything else that is in turn matter for it.) And the final or highest Es in this hyletic teleology will be whole organisms, which are not ‘matter for’ anything further.

(P) A part’s proximate end is that whole for which this part is some of the proximate matter. Here we distinguish two aspects of composition within the step from hyletic x to E: to get from part to whole we must not only add the other parts, but make an ascent in level of matter, in how those parts are synthesized. Aristotle commonly distinguishes three such steps of ascent in level: the elements are matter for [heneken] the homoiomerous parts (i.e. ‘tissues’ such as blood and bone), which are matter for the anhomoiooiomerous parts (‘organs’ such as head and hand), which in turn are matter for the organism itself.

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27 PA 657a32-33: ‘the eyes are watery so that [hina] they [can] see sharply’; 657b36-38: ‘Since seeing is necessarily dulled by [the eye’s] hardness, nature made the eyes movable in insects’.


29 Met 1044b1-3: ‘We need to state the proximate [engutata] causes. What is the matter? Not fire or earth but the proper [idion—i.e. the matter distinctive of the thing].’

30 Cf. Fine's distinction [1992, 49] between a thing's relations to its 'mereological parts', and to its 'material or constitutive parts'; the first holds 'in the horizontal dimension, as it were, without any hylomorphic descent, while the other relation holds exclusively in the vertical dimension.'

31 GA 715a10-12: ‘the matter of animals is their parts—of the whole [animal] the anhomoiooiomers [parts], of these the homoiomerous, and of these the so-called elements of bodies'. Also PA 646a13-24. And PA 646b12-13: the homoiomerous [parts] are for the anhomoiooiomerous, for functions and actions are of [by] these’. Here 'homoiomerous' means 'with like parts'—i.e. like one another, and like the whole homoiomer itself. And an ‘anhomoioiomer’ has parts that are unlike one another.
So e.g. the step from water to blood involves both the addition to water of other elements, but also their synthesis into matter of a higher level.32

It's these 'levels of composition' that let there be proximate ends, inasmuch as they rule out a certain gradualness: if matter-of were simply a part's enclosure within a spatially larger part, this might proceed continuously, like space itself, so that there would be no next-larger part, hence no proximate end. But as it is, the proximate hyletic E is the matter that contains x at the next level. To be sure, Aristotle conceives of more such levels than the four just mentioned, but these are always discrete and noncontinuous.33 For convenience I will simplify to those four levels, ignoring sublevels within them.

We can adapt our notation of xs and Es to pick out these four levels. Let’s use x, x + 1, and x + 2 to reflect the level at which the explanandum lies: an x is at the level of elements, an x + 1 of tissues, an x + 2 of organs. These will be proximately explained, respectively, by an E (a tissue), an E + 1 (an organ), or an E+ 2 (an organism). [If needed we can add a, b, etc. to distinguish separate matters or ends at those levels, e.g. E + 1/a and E + 1/b can refer to different explaining organs, such as a hand and a heart.]

(D) Clearly hyletic ends will usually not be dedicated. A whole will usually comprise and explain matter with more than one part; so there will indeed be an x/a, x/b etc., multiply explained by an E: a tissue takes up and explains portions of different elements. Can there be any exceptions, in which the step from

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32 One of these levels can be skipped over, however: Aristotle holds that some homoiomers don’t function as parts of organs, but as the organism’s ‘food’ [trophê] or residue [perittôma] [PA 647b21-28; also 650b7-13].

33 Cf. Furth’s analysis [1988, 76-83] of six levels. Besides the four above, these include ‘compounds’ (non-biological homoiomers) and parts like the heart that are anhomoiomerous by a structuring that gives different functions to otherwise like parts (see the following note).
part to explaining whole does not involve combining x with other parts, but simply its ascent in level, by itself? It's hard to suppose an organism of only one organ, or a tissue of only one element. But Aristotle thinks there can be an organ consisting of a single tissue—the heart is such, for example. Even here, however, he insists that the organ has unlike parts: since the shape of the heart is functional, its matter in one place plays a different role than its matter in another. So the heart still counts as having unlike parts, because it has parts that are explained differently by the whole, by their different roles within it.\textsuperscript{34} So we don't find dedicated hyletic Es even here. This we do not regret, since it's a main point of the whole-part explanatory strategy, that there be strong downward branching, with each whole explaining multiple parts.\textsuperscript{35}

(C) To explain these parts, we do want our hyletic ends to be complete—so that there's only one whole to a part. And this looks to be usual too, at least given those levels of composition. So, if we begin with some (suitably small) parcel of earth in an organism, this can belong to only one tissue, which can help to compose only one organ, which serves only one organism. Each part finds a single whole at the next higher level. Problems arise, however, if we admit certain intermediate levels into this hierarchy—for example if we think of the organs as structured into 'systems' with different functions in the organism. For some organs may belong to more than one such system. So Aristotle points out that 'the tongue is both towards \textit{pros} tastes and towards speech' [PN 476a19]; each role would group it with a different system of other organs.\textsuperscript{36} In this case there would indeed be an E + 1/a, E + 1/b etc. multiply explaining that x + 1

\textsuperscript{34} PA 647a31-33: 'The heart] divides into homoiomers just like each of the other viscera, but because of its shape of schema \textit{schêmatos morphên} it is anhomoiomerous.' I owe the point to Furth, who quotes this passage [1988, 80]. See also PA 667a7-9.

\textsuperscript{35} Also note that this teleology's intermediate ends (E*s), the functions, are indeed dedicated, for Aristotle. For since 'nature does nothing in vain', 'it makes' only one part for any given functional role [PN 476a15]. So although many parts may serve the same whole, each makes a distinctive contribution to it. However, there can be different parts in other species that perform the same function; so PA 645b9-11: 'to some [animals] blood, to others the analogue that has the same power as blood to the blooded [animals].'

\textsuperscript{36} GA 789b8-11: 'probably [nature] achieves most things with breath as its instrument, for as some [instruments] serve many uses in the crafts, e.g. the hammer and anvil in the smith's craft, so does breath in things put together by nature.' PA 683a20-6 says that nature only uses an organ for more than one function when it is impossible to have
(organ). Since such systems can overlap, Aristotle can preserve completeness in hyletic Es only by denying that systems count as a level of composition. This suppresses information about the organism's hyletic structure, but allows it to be grasped as a hierarchy, which our explanatory interests prefer.

In sum, this hyletic teleology is indeed a hierarchy, branching down but not up, but this is on the strength of Aristotle's thesis of 'levels of composition'. The latter is crucial in providing him with a basic framework of proximate complete Es to anchor this teleology—a framework to which intermediate levels like organ-systems can then be appended.

b. Kinetic teleology. In Aristotle's kinetic teleology the end is the goal of an efficient source, a mover/changer, an archê tês kinêseôs. (It bears reminding that Aristotle's kinêsis is in one respect broader than our 'motion': it covers change from any categorial state to another, not just change in place.) Here the links connect an x and an E, a) as beginning- and end-points of a process, but more particularly b) as source [archê] or initiator of this process and the goal-state it (the source, hence the process) 'aims' at. In the cases Aristotle has primarily in mind, this process is a self-motion, such that c) x causes change in itself, and E is its own later state; the power of x for such self-motion, is what he calls 'nature' [phusis]. I focus on this primary case, and come back later to discuss how this account will extend to motions that are not self-aimed this way.

Aristotle's idea of kinêsis as (in the main case) change that is aimed this way, shows the notion

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37 PA 641b24-25: 'And whenever there appears some end towards which the motion proceeds if nothing interferes, there we say this is for that.' Phy 194a29-30: 'Where there is some end of continuous motion, this is the last and the for which.' Phy 199a8-9: 'Where there is some end, for this are done the earlier and the successive.'

38 Heidegger [1977, 227-228] points out that archê connotes not just source but ordering or control; this suggests the teleological character of the motion it produces. Cf. Met 1013a9-13.

39 Phy 199b15-17: 'For those things are by nature that, from some source in themselves, arrive by a continuous motion at [eîs] an end.'
much narrower (in this regard) than our own notion of ’change’.\textsuperscript{40} It also suggests some of the difference between his ’moving cause’ and the causality we accept; we’ll see further differences as we go. But also clearly, this is where his explanations run closest to our own. So the viability of his kinetic teleology may be of disproportionate importance, in assessing his teleology as a whole.

The kinetic E lies temporally later than the x it explains (by contrast with the hyletic E, a whole contemporary with its parts\textsuperscript{41}). Roughly, we can call these kinetic ends 'goals', as the hyletic ends were 'functions'. So the predator’s goal is (e.g.) to eat the prey. But this is rough or simplifying in a parallel way. Just as in the compositional teleology we found that a function is in fact the hou heneka (an E*) that benefits a hôi heneka (the whole, which is E itself), so here we may think of the 'goal' as that later event (E*), which benefits the mover at the end of the process. So the predator’s motions are ‘for eating’, but that eating is itself ‘for’ improving the predator, i.e. bringing it to a better condition of itself. The goal benefits the mover ‘as mover’—by giving it new or further motive power. Once again, by identifying E not with the goal-event but with that new or future mover, we make it something of the same type as x itself (the present mover), and so can treat it as itself an x + 1 that can be the cause of further motion towards an E + 1.\textsuperscript{42} So here too we can build chains of xs and Es.

Besides distinguishing this E* (goal) between the x (mover) and its E (new mover), we should also recognize certain intermediate x*s: the things the x does, in order to bring about that E* and E. Indeed, more than the mover itself, it’s these ‘motions’ it makes that Aristotle mainly treats as the (kinetic) explananda. The goal of eating explains the steps the predator takes in pursuit. We can therefore analyze the full structure of a link in the kinetic teleology like this:

\textsuperscript{40} Cf. Waterlow 1982, 93ff..

\textsuperscript{41} As mentioned above, I think Aristotle confuses this difference he mainly means, when he presents matter as the raw materials out of which the substance comes to be. See n. 23 above.

\textsuperscript{42} PA 646a32 says that generation is 'from a source [archês] to a source'.
Motion for End: \( x \) [mover] \( \rightarrow \) \( x^* \) [motion] \( \rightarrow \) \( E^* \) [goal] \( \rightarrow \) \( E \) [new mover].

Here again we should distinguish the direction of kinetic explanation, which runs left to right, from that of the teleological explanation which underlies it, and runs right to left.\(^{43}\)

In Generation of Animals, Aristotle examines a special case of such self-motion: the generation of the mature organism, caused by a motive power in the seed.\(^{44}\) Here the original \( x \) is the semen starting to act on the fetal matter, whereas the ultimate \( E \) is the organism's arrival at adulthood, or its \( akmé. \) Intermediate between these are all the motions (\( x^* \)s) and goals (\( E^* \)s) that are requisite for that outcome—for the organism’s arrival at its mature activity. Or, we can treat some intermediate stages as \( x + 1 \), \( x + 2 \), etc., i.e. treat them as intermediate conditions of the mover, such that it ‘aims’ from one to another.

Now of course, the adult makes motions itself, which are likewise explained by goals. We’ll see that these adult motions sometimes aim at their goals in a richer sense than the developing embryo does. So there’s more to the kinetic teleology than the story about generation. Still, for reasons I’ll come back to, this generative \( kinêsis \) is primary, and others need to be understood in relation to it. So I’ll try to sketch the common logic of the kinetic teleology from the case of generation alone.

Let's sample how Aristotle connects bottom to top in this generative teleology. Of course the steps depend on the kind of organism; let’s take the case of ‘blooded vivipara’. Familiarly, Aristotle treats the start\(^{45}\) of generation as the imposition of a male form—enmattered in the \( pneuma \) of the semen—on a female matter—enformed by tendencies of its own, but weaker than the male's, and tending to be superimposed on it.

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\(^{43}\) PA 646a25-28: ‘Now it holds oppositely for generation and for substance—for the later in generation is the earlier in nature, and the first [in nature] is the last in generation (for a house is not for bricks and stones, but these [for] the house…).’ (Note that matter is here treated kinetically, as prior raw materials.)

\(^{44}\) See how he associates 'the source of the moving cause' and 'generation of animals' at GA 715a15. GA 742a16-b18 gives a general account of the role of the motive source. Gotthelf 1987b, 207ff. argues that this is Aristotle's primary use of teleology. (It should be noted that GA is also much concerned with the production of the seed/embryo itself, a prior motion carried out by the parents; I treat this in §3a below.)

\(^{45}\) That is, the beginning of the kinetic explanation—though it’s the conclusion of the telic explanation superimposed on it.
suppressed by it. This male form ‘composes’ [sunistatai] the fetus [kuêma] from the female matter, and from it proceeds to differentiate and develop the main body parts.\textsuperscript{46} So the heart is formed first, and blood-vessels are generated out from it, as a framework in and from which other organs are then formed [GA 743a1-4]. The brain is then formed as a cooling counterweight to the heart [GA 743b29], though its development is slower, and it is the last organ composed, due to its own coolness [GA 744a23]. Here Aristotle focuses on the early, embryological stages in the generation of the adult. But we should see the process as continuing through infancy and childhood, right up to arrival at the functioning adult.

A crucial feature of this motion is its direction by the source or mover, which Aristotle identifies as 'form', but a form localized in certain matter.\textsuperscript{47} Form steers the generative process throughout: it doesn’t release the fetus to unfold by necessity, but continues to ‘compose’ it though all the embryonic processes. This intrusion of the formal explainer into Aristotle's kinetic explanations will be important to us later; how form can be a moving source, bears both on the 'naturalism' of his kinetic explanations, and on the kind of end-directedness they involve.

But here let's note what Aristotle takes as the key sign of such control. The resulting motions have a characteristic temporal order: they happen in the order in which they need to, for the outcome to be reached. So, in genesis, parts are formed in the order in which they are needed, by the functional dependencies among them. The importance of this sign to Aristotle, as a mark of the kinetic teleology, is shown in his crucial use of it in Physics II.8 to establish that nature must be explained by ends, not (Empedoclean) necessity. In this decisive aspect, nature's teleology resembles our own: it makes organisms, in the way we make houses [Phy 199a19]. How Aristotle explains this control—and just what similarities he supposes between our aiming and nature's—will concern us later.

\textsuperscript{46} See Peck 1942, lxi-lxiii on sunistanai and kuêma, important terms in Aristotle’s embryology.

\textsuperscript{47} GA 742a33-34 says the first part formed must be that in which the 'source of motion' resides; this part is the heart [GA 735a21-25].
In modelling this kinetic teleology, we get the conditions for proximacy etc. from the motion-to-relation. It's obvious that transitivity holds: the seed is for the child, and for the adult, since the child is so. As in the compositional teleology, there seems no risk of circularity or reflexivity, here by virtue of the temporal direction of motion: x's kinetic E must be later than x. Still, Aristotle insists on a looser kind of circularity: there's a cycling from seed to adult to new seed, a cycling that lets the process go on to infinity. There’s no final or highest E in this cycling, but there is within each cycle: generative *kinēsis* ends at each adult organism.

(P) There's a problem finding proximacy in kinetic ends, similar to the problem with hyletic ends: process seems continuous, or infinitely divisible. This is indeed how Aristotle treats motion in *Physics* VI, e.g. at 237a25-28: 'Since, then, it has altered in a time, and all time is divisible, in half the time it will have done another alteration, in half of this another, and so on always'. How can we pick out proximate goals within such infinitely divisible process? If an x is for an E, why isn't it for each of the states it must traverse, in order to arrive at E?

Now in the hyletic teleology Aristotle secured proximate wholes, despite the gradualness of spatial containment, by positing discrete 'levels of composition', as stages in the matter-for relation. He secures proximate goals by a similar fiat: x is for a discrete E, and not for those points between—its motion doesn't even traverse those points. This is *Physics* VIII's reply to Zeno's paradox: motions are not actually continuous, i.e. infinitely divided at (or into) points. A motion is defined by a discrete source (x) and end (E). The interval between them is divided at a point, only if there occurs an interruption or reorientation of the motion at that point. Points are 'in' the interval only potentially—in the chance that x's motion towards E will be broken there. In effect, Aristotle's 'answer' to Zeno is to insist on proximate kinetic ends.

(D)(C) It seems—at first—that kinetic ends need be neither dedicated nor complete. For how can we rule out that several processes run together into a single result they are for—a nondedicated end? For example the different parts of some organic system might develop separately in the fetus, before (efficient)
links among them are formed. And why could not a process divide into two or more results it is for—incomplete ends? E.g. a quantity of tissue could develop, and later be assimilated into two separate organs. Indeed, it seems such cases must be usual, in different phases of generation. Incompleteness seems usual at the start, in the differentiation [apokritê] by which the seed unfolds a branching, ever-finer structure of organic processes [e.g. GA 739b37]. A few motions in the simple seed are explained by the many more diverse motions they ramify into. So there's strong upward branching during this differentiation, and complete kinetic Es are rare at best. On the other hand Aristotle also needs all of these branched-out processes somehow to reconverge on the adult organism, as what they’ve all been for—what they’ve been making. This end, explaining all these processes, will be nondedicated. It’s puzzling just how we should fit these opposite motions—towards complexity, towards unity—together.

By contrast with his hyletic teleology—whose hierarchy is so well-suited to our explanatory purposes—Aristotle's kinetic teleology seems to have an awkward shape, and an awkward explanatory logic. A single final E, the adult organism, is the proximate end of each of the very many processes that produced it; those many processes then explain, in reverse temporal order, the fewer and fewer processes that produced them, reaching back to the single seed. The explanatory step from organism to those motions that build it is mysterious, and the great number of those motions makes them a great bit to know, to explain just the seed. Overall, this way of explaining change would be an unappealing alternative to our own kind of causal accounts. Does Aristotle have any prospects of simplifying or trimming that structure?

I think he indeed has reasons to claim that the true logic of this generative teleology is linear—i.e. such that both dedication and completeness hold after all, and there’s a single chain from the bottom x (semen) to the top E (adult). There are two main points.

First, Aristotle has reasons to treat generation as motion of the whole organism from seed to adult stages. For the different developmental processes must be continuously 'coordinated' with one another, in the sense of composing together, at each moment of development, a viable whole. So the explanation of a
particular process can’t mention only its own outcome-goal, but also the role this outcome plays in the next whole organism-stage. It will be the hyletic teleology, of course, that analyzes this coordination of parts to whole. So the kinetic ends of particular processes are subordinate to hyletic ends, which place the former in service of the organism-stage. This means that kinetic explanations are only self-sufficient, when they proceed at the top of the hyletic hierarchy, as the chain of the whole organism's stages. So this generative teleology will be linear. We can diagram part of it:

![Diagram]

Second, Aristotle treats this overall development as steered by a particular part of the organism, which coordinates all the particular processes. GA742a33-35: ‘First there necessarily arises some part in which the source of motion [lies] (for this is straightway the one most controlling [kuriōtaton] part of the end), next after this [arises] the whole and the end’. This controlling part is the heart, where Aristotle thinks the organism’s form is embodied.48 This control-organ is, strictly, the single mover throughout the generation of the adult organism: it is the true source of all the motions in the other parts. And it steers them for the overall E of making itself a more potent mover; for this it builds an adult body around itself.

We want to know, of course, how Aristotle thinks this part exercises its control—in just what way it’s a

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48 GA 740a7-9,18-21: ‘Therefore it [the kuêma] must have a source, from which even the later ordering [diakosmēsis] of the body comes to be for animals. … [T]his [the heart] is source of both the homoiomers and the anhomoiomers. For this is already rightly called the source of the animal and the system, once it needs food’. PA 666a11-b1 argues that all the motions of sensation have their source and end in the heart. PN 469a4-5: ‘the heart is most in charge [kuriōtate], and imposes the end.’ Of course this only holds for ‘blooded’ animals, but Aristotle thinks there must be some analogous organ in other animals (e.g. PA 647a31).
‘source of motion’. I return to this in §4. Here what’s important is the further way this ‘linearizes’ kinetic teleology: the whole organism’s generation is concentrated or centralized in the self-motion of this special part.

In the hyletic teleology we found hierarchy—i.e. Es complete but not dedicated—which is Aristotle’s preferred explanatory logic: fewer explainers of more explananda. Such hierarchy isn’t feasible in his kinetic teleology, at least not in this generative case we’ve examined. But we’ve seen that Aristotle does claim to find linearity, i.e. a single chain of xs and Es running between seed and adult. And this gives him a more promising explanatory schema than the tangle of ramifying processes we noticed first.

c. **Hyletic and kinetic ends.** Now let’s consider some of the shared logic of these two teleologies, as well as how they are related to one another. We’ve seen that each kind of end—hyletic and kinetic—is complementary to one of the non-teleological causes. It shows how that other kind of cause explains, but in subordination to (the explaining by) an end. How does this subordination work?

Each of these non-teleological causes explains ‘the organism’, as I have briefly put it. They explain everything about the organism—all its qualities, quantities, and so on. But Aristotle is most interested in one thing they explain, because it is most what the organism is. He mainly uses matter and mover to explain the organism’s capacity for a distinctive activity. The matter explains by what parts the organism is capable of this activity, whereas the moving source explains by what processes this capacity arose. Or, the matter explains the organism as a whole, and the generative motions explain it as an adult. Hence both

\[
\text{M(atter) expl O(rganism)}
\]

and

\[
\text{S(source of motion) expl O(rganism)}
\]

—where ‘expl’ reads ‘explains’, and is meant in a generic sense. Or, as we might equally put it, O b/c M and O b/c S, where 'b/c' reads 'because' and means 'is explained by'—i.e. ‘is caused by’ in Aristotle’s broad sense. We can express the different ways O is because of M and S, by saying that it is 'of' M and 'from' S—
hearing these prepositions to bear the same sort of weight we've already loaded onto 'for': each of them names a particular kind of relation from explanandum to explanans. And we can specify the relation of explanation by saying that \( M \text{-expl} \ O \) and \( S \text{-expl} \ O \). Aristotle often links these material and efficient causes with one another; together they amount to one main axis of explanation, contrasted with the formal-final one.

Although they explain \( O \) differently, these material and efficient causes are alike in being themselves explained teleologically:

\[
\text{E(nd) expl M(atter)}
\]

and

\[
\text{E(nd) expl S(ource of motion)}.
\]

Or we can say, \( M \text{ b/c E} \) and \( S \text{ b/c E} \), this time understanding the sense of 'because' as 'for (the sake of)', which we've represented by '\( \rightarrow \)'. We can also specify the E: it's the organism once again, since (we've seen) this lies at the top of both hyletic and kinetic teleologies. Moreover, it’s again the organism’s capacity for its distinctive life, that explains both its material structure, and the generative process by which it arose. So we also have

\[
\text{O(rganism) expl M(atter)}
\]

and

\[
\text{O(rganism) expl S(ource of motion)}.
\]

PA 640a34-b4 states this double explanatory role: 'Hence we should especially say that because this is what it is to be a human, therefore he has these; for he cannot be without these parts. ... And because he is of such [parts], his genesis necessarily is such and happens so; therefore this part comes to be first, then this.\(^{49}\)

So the organism is explained by matter and moving source, but also explains them. Are these

\(^{49}\) For the organism as end-cause, see PA I.1, e.g. 641a16, 642a25. Furth 1988, 157: 'the fundamental function ... is to live'. See Gotthelf 1987a, 185 on how camel-as-end must be posited first.
explanations symmetric and mutual? Are matter and mover as much the causes of the O, as the O is (as end) of them? If these causes are equally basic, a full understanding would (as it were) simply pass once around each loop, in either direction:

\[ \text{O expl M expl O ---or--- M expl O expl M} \]

and

\[ \text{O expl S expl O ---or--- S expl O expl S}. \]

If these explanations are symmetric, we could just as well ‘end’ our explanations with matter or moving source, as with the organism/end—either could be the ultimate explainer. But I think it's clear this would misrepresent Aristotle's view how these causes are related; it ignores a priority he insists on.\(^50\)

Matter and source explain the organism, only as what's needed for the organism to be or become. So their explanations of it are 'contained within' the organism's explanation (as E) of them:

\[ \text{O expl (M expl O)} \]

and

\[ \text{O expl (S expl O).} \]

However the reverse way of nesting these explanations does not hold. Matter may explain the organism, but it doesn't explain why it (matter) is itself for the organism. Nor does the source explain why it is for the organism. So:

\text{Not: M expl (O expl M)}

and

\text{Not: S expl (O expl S).}

Explanation begins with the organism, not the matter or source. This asymmetry between these explanatory strategies is the crux to Aristotle's case against materialists. It is due, of course, to the different way the O

\(^{50}\) E.g. Phy 200a32-34.
explains M, than the M explains it. Those formulae can be rewritten: $O \ E^{\text{expl}} (M \ M^{\text{expl}} O)$ and $O \ E^{\text{expl}} (S \ S^{\text{expl}} O)$. The E-explanation—the teleology—for some reason trumps the M- and S-explanations.

Aristotle states this subordination of the material and motive causes, in his well-known doctrine that their 'necessity' $[\text{anankê}]$ is 'hypothetical' $[\text{ex hupotheseôs}]$. Materialist philosophers had treated these causes as necessitating physical processes, and organisms in particular: that the elements move so-and-so, is a sufficient condition for organisms to become and be. But this appeal to these causes misses, Aristotle urges, how M and S are themselves necessitated, as means to the end: because it's to be, they must be. It’s this ‘hypothetical necessity’ of M and S themselves, and not their necessitation of the organism, that is the key to explaining nature.

Now since I’m here only mapping the explanatory paths Aristotle offers, and not looking closely at just how they explain, I’ll defer (until §5) the question just how the E 'necessitates' the M or S. With our expectation that explanation works ultimately by (our kind of) efficient causes, we’ll want to know whether the hypothetical necessitation of M or S somehow involves a prior efficient cause for them. But for now let’s rest with the point that M and S are crucially explained by their respective Es.

So a) Phy 200a12-13: 'it is necessary for it to be made of iron if there is to be a saw performing its function'. And b) PA 639b27-30: 'If there will be a house or any other end, it is necessary that ... first this come to be and be moved, then this, and thus in turn as far as the end and that for which each comes to be and is.' Aristotle maintains that O, as hypothesis or end, necessitates M and S, and that this trumps or underlies any sense in which M or S might necessitate O. 51

These explanatory loops, from O to M to O and from O to S to O, are the core to Aristotle’s explanations—but the latter branch out from it. In particular, once the O explains the M, the M can explain other things besides that O itself. But here too we need to pay attention—where it’s harder to do—to the kind of explanation M gives of these things. Some of these things the M M-explains, but others (in its
identity as an E-1) it E-explains.

Let’s start with how the matter can explain as an end. We’ve seen this nearly from the start: that matter lies at multiple levels, with each ‘for’ the one above it. So the organism’s proximate matter—its system of organs—explains ‘down’ through the lower levels of M + ns: why those tissues are there, why those elements. (Similarly the proximate S explains back through the stages of the organism’s generation.)

So:

$$O \text{-expl } M \text{ E-expl } M + 1,$$

as the organism explains the eye explains the eye-jelly (the eye-jelly is for the eye is for the organism).

And:

$$O \text{-expl } S \text{ and } S \text{-expl } S + 1,$$

as the organism explains the child explains the fetus (the fetus is for the child is for the adult organism).

Since these explanations by M are teleological, like the O’s explanation of M, they extend the O’s teleological reach. They let the organism explain all the way down to its simplest parts, and to the seed it began as.

But there are other things matter explains, besides its own parts, and besides the organism (and its characteristic activity). Some of these it explains without subserving a teleological account.$^{52}$ For not everything about the organism is for (the sake of) the organism. Some Ms or Ss that are hypothetically necessitated by O, have as side-effects to their 'service' of O, neutral or even detrimental results. So the eye-jelly, by its functional need for sight, is fluid—and therefore delicate and susceptible to damage. So the organism E-explains (through other compositional levels) the eye-jelly, and the latter S-explains why it is damaged by a blow. **O E-expl M and M S-expl x.** But here the organism’s teleological reach is not extended. The organism doesn’t E-explain the damage (x); the latter is not for the organism, but an

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51 On the priority of the for which to necessity, see also GA 789b3-15.
52 GA 778a34: 'some things do not tend towards the account of [the animal's] essence, but come to be by necessity, and their causes must be referred to the matter and the moving source'.

And there can be similar non-functional side-effects of the generative process. Such cases however are secondary, and not the usual. In the main, the organism’s matter explains how it can live its species-life, and its generation explains its arrival at this ability.

These hyletic and kinetic teleologies are obviously vital to Aristotle’s biological explanations. Nevertheless, I think accounts that focus attention on either or even both of them, miss his real crux. They grasp how matter and motion are ‘for’ the organism, but they miss how this organism—with that capacity and that life—is itself for something further. Neither the functional nor the generative teleology supplies this ‘something further’: neither extends past the organism, to explain it by some higher E. The organism—as able for particular activity—is the ultimate or highest E for both teleologies.

a.) There's no higher function-end, since there's no fuller whole that the organism serves as matter-for. Here I follow the prevailing view that discounts the very rare passages in which Aristotle attributes to organisms some role in a broader system, by making them serve either their own society or species, or even other species of organisms.

b.) There's also no higher goal-end than the organism—no motions carry it to any higher ends than itself. Generation is toward the adult organism, and while this adult of course moves many things in turn, the changes it effects aren’t what the organism is for. The goals of the adult’s behavior explain what it does.

53 In one striking case the side-effect is itself matter, and within the organism, but perhaps not the organism’s matter: this is what Aristotle calls 'residue' [perittôma], e.g. useless byproducts of digestion [PA 677a15ff.]. This is matter within (the spatial boundaries of) the organism, which is necessitated by the organism's activity, but without having a functional role of its own. Or, if it has a role, this is only deficiently, as 'what's-to-be-expelled'. It's not strictly a 'part' of the organism at all.

54 GA 778b12-16: ‘So each [animal] is for something, and there comes to be through this cause and through the remaining [causes], everything contained in its logos, or which is for something, or is [itself] a for which. Of what is not such, [but] is generated, one must seek the cause in the motion and the genesis, as having its difference in this constitution [sustasei].’ The example he gives just previously is eye color: ‘The eye is for something, but the blue is not for something, unless this is a special affect of the [animal’s] kind.’ [GA 778a33-34]

but they don’t explain it, the organism itself.\textsuperscript{56}

§3. The ends of \textit{ousia}: eidetic teleology. These organisms, standing as the top Es of Aristotle’s hyletic and kinetic teleologies, are his paradigm cases of \textit{substance} \textit{[ousia]}—they are ‘substances if anything is’ [Met 1032a19, 1034a4].\textsuperscript{57} (Even craft-products like houses and statues—as well as the elements and inorganic compounds—are substances in a weaker sense.) And substances are of course what there is most of all, for Aristotle.

We’ve seen that it’s ‘in a certain aspect’ that these organisms play those explanatory roles: it’s the organism ‘as capable of a distinctive activity or life’, that explains its matter and its genesis. Now we should add another name for this crucial aspect: it’s the organism as \textit{form} \textit{[eidos]} that is the hyletic and kinetic E. For Aristotle makes clear that form is precisely this capacity for a distinctive activity. As such, form is ‘first actuality \textit{[entelecheia]}’, whereas that distinctive activity is ‘second actuality’ [DA 412a22-28]. It’s because form stands as E in those teleologies, that Aristotle so closely associates the formal and final causes, and even says they’re ‘one’ or ‘the same’.\textsuperscript{58}

Even inorganic matter can have form, for Aristotle: it can be capable of some distinctive change or motion (as earth moves towards the center). But when the form is a capacity for life-activities, Aristotle calls it a \textit{soul} \textit{[psuchê]}.\textsuperscript{59} (So, familiarly, he means by soul not a spirit distinct from matter, but a capacity of the matter.) Hence it’s also the organism’s soul, that is the E explaining its matter and genesis. DA 415b15,18: ‘the soul is also the cause for which’, ‘[all natural bodies, of animals and plants] are for the

\begin{footnotes}
\item[56] GA 736b2-5: ‘For the end comes to be last, and the peculiar [species-character] is the end of the generation in each [individual].’
\item[57] See Kosman 1987.
\item[58] Phy 198a25-26, GA 715a5,8.
\item[59] Two of \textit{De Anima}’s well-known definitions of soul: ‘the soul must be substance as form of a natural body potentially having life’ [412a19-21] and ‘if we must say what is common to every soul, it would be the first activity of a natural organized body’ [412b4-6].
\end{footnotes}
soul.\textsuperscript{60}

Form is a capacity for \textbf{distinctive} \textit{idion} activity, and this plays a key role in identifying this E. Aristotle here means: \textit{distinctive of the organism’s kind or species}. A cat’s form is its capacity for the activities distinctive of its species—not that more particular package that may distinguish it as an individual. So different cats have different instances of the same form, not forms with any different content. (I return below to the issue whether Aristotle allows ‘individual forms’.)

Our quick way to the crux of Aristotle’s teleology, is then to ask what, if anything, this organism—or its form or soul or capacity—\textit{in turn} is ‘for’, and explained by. If the hyletic and kinetic dimensions of teleology co-culminate in the organism’s form, which explains—as an end—both its functional structure, and its generative origins, is there anything that so explains this form itself? Or is it unexplainable—or else explainable only in some non-teleological way? Is it, perhaps, explainable only by the \textbf{reverse movement} along the dimensions just traced—explainable only by material and efficient causes, rather than by any further end?

I’ll try to show that Aristotle does offer a further end, a third axis of teleological explanation, which brings us to the ‘top’ of his teleology, and the start of its explanations. We find this third axis by seeing how the \textbf{formal} cause also explains in conjunction with an E. Like matter and mover, form too is soaked with teleological sense—is understood/defined as a complement to, in tandem with, another kind of end it is for. In thinking of form, Aristotle thinks of a (teleological) reason \textbf{why} this form. Here we meet his most basic teleology: the \textbf{formal or \textit{eidetic}}\textsuperscript{61} teleology, which supplies the end that anchors all the directedness of parts and processes. To understand those hyletic and kinetic 'towardnesses', we must see how they start with and presuppose this 'higher' teleology:

\textsuperscript{60} DA 416a13-15 subordinates the hyletic or kinetic cause to soul, saying that fire is an ‘accompanying cause’ \textit{sunaition} of feeding and growth, ‘not absolutely \textit{haplôs} the cause, but rather the soul [\textit{is}]’.

\textsuperscript{61} (From \textit{eidos}, Aristotle's primary word for form.)
This eidetic system adds key detail to the hylletic and kinetic explanations, and shows how (Aristotle thinks) they can explain at all. However his point is more subtle and surprising than the way he explains matter and motion by ends; I think it has been generally missed in treatments of Aristotle’s teleology.

Now it may seem that the answer to our question what the organism’s form is for, is quick and obvious: it’s for its activity [energeia] or action [praxis]. Form is, after all, a ‘capacity for distinctive activity’. Here we have a third relation of means to end, now not of organ to organism, nor of seed to adult, but of adult organism to its own activity, its living. While it is merely resting or sleeping, the organism is indeed both a compositional whole, and a generated result. And it possesses that capacity which constitutes its form and soul. But there’s a different dimension of completion or perfection, which it traverses when it acts. Familiarly, Aristotle conceives of these resting and acting conditions as first and second energeia respectively. The transition between them looks to be that from form to its for which (to form’s E)—which is what we're after.

Moreover, it seems activity may or must be the ‘top’ end, since Aristotle explicitly denies that it is for anything other than itself. He stresses that activity or energeia is done for its own sake, and hence is complete in each moment; it differs from motion [kinēsis] in just this respect. Familiarly, Aristotle marks this difference by whether certain tensed descriptions of a doing can be co-applied. Motion is a transition to

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62 I consistently render energeia with ‘activity’, though in many contexts ‘actuality’ may seem more apt. See Kosman 1984, 121 on these alternatives, and Kosman 1994b arguing in favor of ‘activity’.

63 PA 645b15-17: ‘Since every organ is for something, and each of the parts of the body is for something, and the for which is some action, it is clear that the whole body too was put together [sunestēke] for (the sake of) some multipart [polumerous] action.’

64 Met 1048b22-35; NE 1174a14-b6. See esp. Kosman 1984, 123ff. on the contrast between motion and energeia.
a terminus, at which the M-ing ends, and the having-M-ed begins: while x is towards E, E is not yet; once E is, the towardness is over. But since activities are complete or 'final' [teleios] even while they proceed, the description 'A-ing and having-A-ed' applies to them: the E must be in the activity itself. And this is borne out, it seems, in the way Aristotle treats each organism's end as the fine performance of its specific activities—living well the life of its species. Isn't happiness our own highest end, and isn't this just such excellent activity?

However, as an account of Aristotle's 'highest' teleology, this answer would be disappointing. The reference to ‘activity’ doesn't really carry us beyond the functional and generative teleologies we've already met: in giving us the organism, they already gave us its activity. The energeia mirrors in all its details the power or dunamis for it. So how can the activity, by itself, explain that power? Between these two there isn't enough distance, to open up a teleological space like those in matter and motion.65 Or, at best, we have a space defined by only two members—the power and the activity; since the latter isn't itself a power (x + 1) for any further activity (E + 1), there couldn't be any chains of xs and Es in such a teleology. I think this denial that there's any further end for activity, is the main challenge to my suggestion of an eidetic teleology; I'll treat it as I go.66

(Notice that this denial depends on understanding activity as only the conversion of whatever potentiality is particularly there. That is, it depends on ‘activity’ having no content itself, but being merely a kind of ‘turning on’ of some particular potentiality. Later I’ll introduce a different sense for activity, by which it is a positive condition, achieved by that turning-on of a potentiality, but definable independently of it. This positive notion of activity will be one of the two main ways Aristotle thinks of the ultimate ends in this highest teleology. But before we can consider it we need to see the logic of this teleology itself.)

65 Compare Furley [1996, 67]: ‘I am not clear … that anything is being said, beyond a repetition of the definition [of potentiality], when it is said that the natural end is actuality.’

66 I think Gotthelf [e.g. 1988, 120f.] takes this view; I discuss him below.
I'll argue that when Aristotle denies that activity has any ends outside it, he means any kinetic ends. In organisms' activity, ends aren't later stages in the process, but lie ‘ahead’ of it in a different, nontemporal dimension. Because eidetic ends aren't futural to the xs they explain, it can be true that the organism is 'A-ing and having A-ed', i.e. that such an end can be achieved at the very time (and 'by the very act') of the activity 'for' it. This is why, I think, the distinction between \textit{kinēsis} and \textit{energeia} is so important to Aristotle: it marks a major node, a shift in the dimension of his teleology—not its termination, but a turning in it. But we still need to locate this new dimension.

Think first of a seemingly non-teleological way Aristotle explains organisms: in \textit{Posterior Analytics} he presents a well-known methodology that understands them by setting them into a hierarchy of specific and generic essences of living substances. This classificatory project, of placing species under higher genera, and these genera into a upward-converging hierarchy, is an obvious, striking, and hugely influential feature of his biology. In it, the highest or first principles are definitional truths about the highest genera for organisms, and below these is a branching system of definitional truths about more specific types. Each lower definition includes the conditions in all its 'ancestors' (i.e. those above it in a direct line); each adds a further set of differentiae to pick out its more specific essence within its immediately-higher type.

I'll argue that, despite appearances, these classifications are crucially teleological. They are the site of Aristotle’s highest explanations by ends. So his classificatory hierarchy constitutes a third network of xs and Es, in which the xs are forms, and the Es are higher genera that explain those forms.

But how could this be? Those classificatory hierarchies don’t seem teleological. Higher genera don’t seem to be higher ends. But by classifying the forms I think Aristotle is also explaining them: the genus shows what the species-form is for.\footnote{Balme 1987c, 298: 'The explanatory power of essence is that it reveals the teleological features'.} Whereas the subordinate teleologies plot the relations 'matter for E' and 'mover/doer for E' respectively, this plots the relation 'form for E', where 'form for' refers to a
(species-)form \textit{[eidos]} as within a genus \textit{[genos]}\textsuperscript{68} (or to a genus as within a higher genus, though I’ll focus on the former case).

The key to seeing this is to recognize that these forms are ‘ways of life’, (as it were) \textbf{strategies} for living. So the organism's species way of life is a strategy-for some generic life-kind, which this species form both instantiates, and is for.\textsuperscript{69} At the top of the formal hierarchy, the first principles distinguish the broadest life-projects of organisms. As we ascend towards this top, the growing generality crystallizes ever more clearly the point of each activity; at the very top, we find the point of life itself. Or, as we descend from this top, the differentiae progressively divide living things, by picking out distinctive strategies by which the narrower types pursue that ultimate project. I'll try to show that by seeing this teleological point to Aristotle's classifications, we can answer some puzzles recently posed about them.

In this eidetic teleology, x is (in each case) the package of capacities distinctive of some species. Or, since these capacities are closely isomorphic with activities, x is the package of activities that constitute the (way of) ‘life’ typical of the species. But this life is one way of carrying out a broader project E, typical of a genus to which the species belongs. As we follow chains of eidetic xs and Es ‘upwards' to ever-broader projects, the basic point of the species’ activities becomes increasingly clear. When we see, for example, how the cat's activities are versions of projects it shares with more and more other species of animals, we understand those activities as ways of achieving certain broader ends. And as we make this ascent, we become able to judge the species’ activities as 'better or worse'—compared with its congeners, in degree of success at the generic project.

As in the hyletic and kinetic cases, here too we can find intermediate elements within each ‘link’

\textsuperscript{68} Lennox [1985, 1987b] argues against translating \textit{eidos} with ‘species’ and \textit{genos} with ‘genus’, for reasons I take up below (he favors ‘form’ and ‘kind’). Although I’ll retain ‘genus’ for \textit{genos} I agree it should be heard not in our own classificatory sense, but more loosely as any broader kind. See also Balme 1987a, 72 on genos/eidos.

\textsuperscript{69} Charles 1991b, 251: ‘To have a common nature is to have a distinctive way of fulfilling at least some of the basic life-functions.’
between an x and its E. On the side of the x or species-form, there is the ‘differentia’, i.e. what makes the form something idion, i.e. peculiar or distinctive. We can label this the x*. It is the distinctive way the species carries out the generic activity. And on the side of this generic activity there is always some point or purpose, which that differentia is a specific strategy or means of achieving. It’s this purpose that emerges as we ascend to the highest genera of organisms. I’ll call this the activity’s ‘aim’, to distinguish it from the ‘goals’ we attribute to kinetic processes, and the ‘functions’ we attribute to hyletic parts; we can label it E*.

So we have:

**Form for end:** x [species] → x* [differentia] → E* [generic aim] → E [genus].

(Here ‘species’ refers, we remember, to a form or capacity for a distinctive life. And ‘genus’ refers to a more general capacity—a ‘project’ which the species-life is one way to effect.) Again the teleological explanation runs from right to left. But again Aristotle recognizes a subordinate explanation running from left to right: there is a way, we’ll see, in which species explains genus, and in which the whole system of substance-forms explains the end (it lies in the way just noted in which the end ‘crystallizes’ from the system of particular forms).

The eidetic teleology is a network of chains of such links. Let's quickly map it, by asking and answering our usual questions. It's the *De Anima* that treats the 'top' of this structure, its highest Es; this makes it the key work in Aristotle's biology (and therefore in his ‘ousiology’—his theory of substances). It distinguishes the most basic types of souls and lives, and the ultimate purposes of all life-activities. So it's here that we learn what e.g. cat-life itself is for, by seeing its component activities as versions of the basic life-projects.\footnote{DA 413b32-414a1: ‘to some of the animals all these [parts of soul] belong, to others some of them, to others only one (this makes the difference among animals)’} Aristotle's broadest genera for activities are the nutritive, perceptive, and intellective—which I'll follow Furth in calling 'threptic', 'aisthetic', and 'noetic'; these are the life-types of plant, animal, and human, of course. Our main interest in Aristotle's eidetic teleology will be in these ultimate projects; I’ll
introduce them in the next section, and treat their (teleological) relations in the section after.

What about the 'bottom' of this teleology, its lowest xs? In descending by progressive differentiation of life-strategies, how far down do we go—what are the lowest explananda? I’ve asserted that these are the species forms—cat-life, for example. Aristotle refrains, I think, from treating these species forms as themselves generic projects, which individuals—individual cats—have their own forms of activity for. Although he may allow ‘individual forms’ in some contexts, he won’t allow them to play the explanatory roles we’re here interested in. The organism’s matter and genesis are for its species form, not an individual form—so it’s species form that is the final explainer in the hyletic and kinetic teleologies. And—by a change in explanatory direction—it is then the ultimate explanandum in the eidetic teleology.

Let's turn to the structure of the chains that run between this top and bottom. Below those broadest life-projects, types are progressively divided as strategies for accomplishing them. So the near-highest types are defined in terms of those projects: modes of nutrition (blooded etc.), of reproduction (viviparous etc.), of locomotion (flying etc.). Each of these strategies involves, and is most readily studied as, a basic ground-plan or structuring of parts; the further division of these strategies is therefore pursued by detailing differences in these parts. But the parts are used only as indicators of the particular version of nutritive etc. activity the organism engages in (the hyletic teleology is used as a clue to the eidetic). This classification explains, by citing the broader kinds of life this organism's life instances. Since broader kinds will explain through more particular ones, transitivity seems to hold. Since explanation runs from higher to lower genus, circularity and reflexivity seem excluded.

(P) Proximacy will hold for eidetic ends, if there’s always a next higher genus for any individual or kind. I take it that Aristotle thinks so. The transition from lower to higher forms isn’t gradual or continuous, but occurs by discrete steps. To be sure, Aristotle stresses the gradualness of the transitions

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71 It's the History of Animals that gives the most details of the microstructure of this teleology. Relevant aspects of its overall method are described in HA I.1-6, and in PA I.2-4.
from nonliving to living, and between species. But these are 'horizontal' relations between kinds, not 'vertical' relations between species and genera, which is our concern. Since a genus always groups a species with some number of other species, we could at least determine proximacy by how many other species a genus includes. A genus G will be proximate for a species S, if there’s no ‘intermediate’ genus that includes S plus a (partial) subset of the other species in G. So we will be able to find minimal units to serve as 'links' in our eidetic chains.

(D) **Dedication** (absence of downward branching: for an E, only one x) will be ruled out if we think of higher genera as always grouping more species than the genera beneath them. And it’s clear that the overall structure of this classificatory network is highly hierarchic, since it explains all the many species of organisms by the three ultimate life-projects. To be sure, some species are more unusual, and have fewer close congeners; their proximate genus may lie at a high level in the hierarchy, and group it not with a few close relatives, but with a large family of species. The main case is of course the human species, which is the sole instance of the basic project of *noêsis*, and so combines with other species only at the level at which this basic project joins the other two.

(C) **Completeness** (absence of upward branching: for an x, only one E) poses the main problem. Unlike dedication, this is a condition we would prefer to impose, since with complete ends our explanations would be self-sufficient. And at first, it looks likely completeness will hold—given that Aristotle’s classification has traditionally been read as a Linnaean hierarchy, in which each species falls under only one proximate genus, and not under several that ‘overlap’ in containing it.

However, grounds have been given for doubting this traditional reading. Balme and Pellegrin argue that Aristotle is after something different from a Linnaean taxonomy; his purpose is explanation not classification, and his explanations can conjoin features that descend through the structure along different

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72 E.g. PA 681a12-15 and HA 588b4-6. Aristotle treats the species of a genus as differing from one another only in degree; see Lennox 1987b, and e.g. PA 644b11-15.
paths. Balme [1987a, 73] finds the main novelty in Aristotle's method of division, his allowing for simultaneous division by multiple differentiae. This means, in our terms, a rejection of completeness. Genera are not mutually exclusive taxa, but overlapping groupings of species by different shared features. Pellegrin [1987, 336] identifies these features as the parts, but I'm arguing that they're the species' activities-as-strategies.

The species’ distinctive ‘life’ is a package of activities, different of which it shares with different groups of other species. So cat-life is explained by multiple paths leading down through overlapping groups of blooded, viviparous, walking (etc.) animals; the cat’s seeing-activity is explained by grouping it with species that see in this way, while its digestive activities group it with a different set of similars. So it seems there will be strong upward-branching in this teleology: a web of ends, not a hierarchy.

Nevertheless, though we must recognize this web of incomplete ends, we should also see that Aristotle has tactics for finding complete ends, and hierarchy. He has reasons to treat the whole life as instantiating more and more general whole-life-types. For it is, after all, the whole organism, with its package of activities, that is being explained. And Aristotle sees that to explain it he must not only show the multiple generic strategies these separate activities serve, but also the ways these strategies combine, and affect one another in combination. He must see how the species-activities indeed form a ‘package’, a life. To follow him here, we need further details of this hierarchy.

§4. The highest eidetic ends: life's ultimate projects. So much for our overview of the formal teleology. The most vital problems now concern the structure and relations of its 'top' activity-types, its ultimate explainers. It's here we find life's point, for Aristotle. Each of these highest genera—thereptic, aesthetic, and noetic—is itself a complex project, or system of sub-projects, as for example the aesthetic life

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73 So, as mentioned above, Lennox [1985, 1987b] argues that it’s better not to think of species and genus here, but only of kinds and higher kinds.

74 See e.g. the account at GA 717a14-19 on how the placement of birds’ legs means they can’t have a penis.
includes not just perception itself, but imagination, desire, and movement; these sub-projects have aims of their own, and also serve one another's aims. Each project involves, crucially, not just a distinctive end, but a distinctive way of being towards its end; each has its own kind of end-directedness. We need first to clarify the **internal telic structure** of threptic, aesthetic, and noetic activities respectively (this §4), but then to examine the relation of these activities to one another—their **external telic relations** (§5).

Our main question about these **external** relations, will be whether these broad life-projects stand as means to (or efforts at) one another. For example, does perception ultimately serve threptic aims—the cat seeing in order to feed and reproduce? How shall we plot our three highest genera? Are they alongside one another, as equally-ultimate projects—plant, animal, and human? Or is the threptic the ultimate type, including all organisms, and the aesthetic and noetic identified as kinds or species of it? Or do they form some other hierarchy? If one of these three does have the others arrayed (as sub-strategies) under it, we'll find a complete end at least at the **top** of the eidetic teleology, as at the tops of the hyletic and kinetic.

Our main puzzle about the **internal** structure of these generic activities, is how their 'internal aims' are compatible with their status as activities. (Above, I labelled these aims as the E* in the schema for a ‘link’ in the eidetic teleology.) Each of these generic activities is a complex of projects achieving certain results: for example, under threpsis fall the projects of changing unlike matter into like (digestion), and distributing the heart's heat through the body (circulation). But why should we not treat those results (the like matter, the pervasive heat) not as eidetic aims but as kinetic goals—hence as explaining the processes by the kinetic teleology we saw before? What I’ve called ‘activities’ seem to be just the motions of the mature organism—which were ignored in our look at the kinetic teleology, because we focused on the generative motion to maturity. So why should those threptic processes also count as activities, and need to be explained by eidetic as well as kinetic ends? To hold these eidetic explanations clearly separate from kinetic ones, I must show how they explain by an E that is **not** just the goal of a motion.
We will find that the three primary life-types differ not only in their ends, but in how they are for them. As I'll try to show, it's these telic differences that crucially distinguish plants, animals, and humans. The three basic life-projects are built one on the other, as a series of levels of teleology. So, ultimately, the noetic strategy differs from the aesthetic by aiming at Es that it reasons as future goods. Here teleology is (what we would call) intentional: there's a prior representation of the end, that explains behavior. And here teleology looks respectable—which then invites us to ask, how it could be so in the other cases, the threptic and aesthetic, to which Aristotle likewise applies it. Once we have clarified the structure and relations of the basic life-projects, we will have mapped the top of Aristotle's entire teleology. This will put us in a position to evaluate it, in its final supports.

a. Threpsis [=T]. The threptic power belongs to every organism,75 and it belongs only to organisms.76 Its core activities are self-preserving, especially by 'feeding', and self-reproducing. DA 415a25-26: 'Its functions [erga] are to reproduce and to use food [gennēsai kai trophēi khēsthai]. Put more abstractly, its activities are preserving and repeating, by the substance of itself: the organism continues itself, as a power, into the future—and also it copies itself, and finds another sort of survival in these copies. Aristotle thinks these threptic projects explain the organism, in its species-type, and that this in turn explains its parts and processes.77

Now each of these threptic projects, it seems, is defined by a certain result—the event or state of either continuedness or copiedness. We must ask: Why don't these 'aims' of threpsis simply explain it kinetically, as the goals of a motion—hence by the teleological framework we mapped back in §2b? We

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75 DA 415a23-25: 'For the threptic [threptikē] soul belongs also to the other [living things], and is the first and most common power of soul, through which life belongs to them all.' Also DA 413b1-2, 434a22-26.
76 DA 415b27, DA 416b10.
77 GA 716a23-27: 'Since [male and female] are differentiated by their power and their function [the male to generate in another, the female to generate in itself], and organs are needed towards [pros] every functioning, and the organs of these powers are parts of the body, it is necessary that there be parts towards begetting and coupling....'
there saw how generation is a motion explained by its result, the adult organism; we expect the motions of this adult to be explained the same way, by the outcomes they finish in. Where is there need or room for any eidetic ends explaining it as activity? So I must clarify the peculiarly eidetic character of these outcomes, how they’re more than just goals, for Aristotle.

We should also consider how these two projects—self-continuing and self-copying—are related to one another. What is it that connects them as both threptic? Is either ‘for the sake of’ the other—so that the latter would be the ‘higher’ threptic aim, the prior explainer? But first let’s look at these projects.

i) **Preserving** [sōzein] [=P]. Aristotle, like Plato, mentions first the project of ’surviving’—of continuing or maintaining the organism, as a living power. This self-preserving is the only indispensable and universal activity of life, and Aristotle sometimes identifies the threptic with it alone. Its aim—surviving—has a metaphysical aptness, we feel: what end could be more basic, than that of continuing to be?

Now Aristotle doesn’t think that every process has this aim to continue—this isn't a metaphysical ur-will. It doesn’t hold of non-organic processes. Nor is it that every organic process aims to preserve or continue itself: many are periodic, or sporadic, or even single/unique—and are ‘for’ no more continuous or frequent an occurrence than this. Digestive activity isn't for preserving itself, but the organism. So the organism’s power to survive isn't summed up out of separate and selfish survival-efforts by all its various processes and practices. These aim not at their own continuance, but indeed commonly at goals at which they cease (if only temporarily), but which help the organism to survive.

It’s the organism as form that gets preserved. This form (as we’ve seen) is the individual organism’s capacity for its distinctive species activity. And this gives to the aim of preserving a dual reference to both individual and species. The direct point of preserving is to continue the individual, not the
species: the project doesn’t approve sacrificing the individual to its kind. Still, the individual it preserves is itself defined as an instance of a species-wide capacity. The cat’s threptic aim is to preserve itself as a cat.

Some particular motions are key for preserving a form-in-organism, and Aristotle especially thinks of these as 'threptic'. As Furth [1988, 148-9, 156ff.] notes, they are largely what we would now call 'metabolic'. Similarly, some particular organs play key roles in carrying out these threptic motions.

In DA Aristotle stresses 'feeding', which he analyzes as transforming unlike matter into like. The aim of this feeding is not to grow—though Aristotle often mentions this too—but to sustain the organism as a substance, i.e. its capacity for species-activity. What's incorporated is 'growing' [auxētikon] for the organism as a 'how much', but 'food' [trophê] for it as a 'this and a substance' [DA 416b13; also GA 744b36]; food ‘preserves the substance’ [DA 416b14]. He singles out food as the ‘object’ of the threptic power—just as the aesthetistic and noetic powers will have their objects.

The key to preserving the organism is to sustain the body’s ‘heat’ [thermotêtos], so that this is the concrete work of feeding, its principal material effect. Moreover, the organism needs not just to maintain this heat—which in ‘blooded’ animals is localized in the heart—but to distribute it to all its working parts. So Aristotle also counts as threptic the circulation of blood, which spreads this heat through the body, and thereby holds its structured parts together (in themselves and with one another), against the contrary tendencies of the elements to pull apart [DA 416a6]. So the motions of eating, digesting, and circulating are all centrally involved in threpsis.

But in the midst of these motions, where do we find the ‘activity' needed for our eidetic teleology? It's in these same processes, but under a different aspect. Conceived as motion, a process is for its goal, and

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78 I’ll later consider and respond to an argument that it is the species after all that preserving preserves.

79 DA 415a22.

80 See Freudenthal 1995 on the crucial role of ‘vital heat’ in Aristotle’s picture of life.
is incomplete until it reaches it. Conceived as activity, a process is for the generic life-project it instances. Take a cat's digestion of a mouse it has just eaten. As a motion, under the kinetic teleology, this x is explained by the E of mouse-matter-transformed-into-cat-matter, the future result and end-point of that motion. As an activity, under the eidetic teleology, this digestion is explained by the generic project of preservation, of which it's a specific form. So this process in the cat is understood by classing it with similar processes in wider and wider groups of other species, thereby progressively revealing the basic life-role it plays. At the broadest and top level, the digestion is explained as 'preserving this capacity for a species-life'.

It's easy to mistake this preserving as itself a kinetic goal. The organism carries out motions, in each of which it or some part of it changes in quality, quantity, etc. from predicate P1 to P2, from time t1 to t2. And the overall result of these motions, a kind of 'macromotion', is that the organism survives from t1 to t2: the goal-result of this overall motion is simply its arrival intact at t2. To be sure, there's something odd to this motion of 'persisting to t2'; we might have rather called it an absence of change or motion. But even apart from this, preserving, as the highest threptic end, is something else again than just that outcome.

Eidetically, all of these processes are for (the sake of) being preserving, not arrival at having preserved. The formal character of these processes—the highest genus they belong to—is a certain project, not a result. This project is defined by its 'internal aim', which involves such results. But the eidetic end is the project, not these results. The point is not to arrive at t2, nor even to arrive at as late a t as possible. Rather, it's to be doing the things that are suited—for members of its kind—to effect those results. Hence the organism is already 'at' the end, all the time it carries these processes out.

So the eidetic end is not 'to survive to as late a t as possible', but to do well the project towards this. This E is not the result but the genus of x, and this opens a sense in which the process can be an 'end-in-itself', something done for its own sake: x is for (the sake of) something it already is—being preserving activity. This doesn't mean that x is simply identical with E, however, so that reflexivity would hold in this
eidetic teleology; E is still distinct from x, as a broader strategy of which x is a special case.

ii) Generating or reproducing [gennêsai] [=G]. The second threptic process is 'to make another like itself [to poiêsai heteron hoion auto]' [DA 415a28; also 416b24]. This may be less universal than preserving, since in some species organisms can arise by spontaneous generation; in them one organism doesn't generate another like itself, but something different and sterile. But nearly always, an organism has the second basic project of copying itself. This 'generation' is different from that we examined in §2b: there it was the copy's own growth to adulthood, here it is the parent's production of the copy.

When we eventually (in §6) examine Aristotle’s relation to our own Darwinian explanations of organisms, we’ll look more closely at this project of generating. But for now this outline is enough: Generating brings into existence another organism that is ‘like’ [hoion] the generator. This alikeness is crucially a matter of having the same form, i.e. being of the same species. Aristotle thinks that offspring tend to resemble parents more finely than this—i.e. by sharing contingent characters like eye color. But the generative power is essentially the power to make another individual of the same species. So the outcome of generation is ‘cycles’ of conspecifics.

Once again, to find the eidetic E we need to distinguish how reproductive processes can be activity. As motions, they are for (the sake of) goal-results, and are mapped by the kinetic teleology. But as activity, they are a strategy-for a generic project, grouped with overlapping sets of other organisms into a hierarchy of ways of executing this project.

It's even easier to mistake reproducing as only a motion, than it was to mistake survival. With the

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81 Pol 1252a28-30: ‘as also in other animals and plants, it is natural [for humans] to aim to leave behind another such as to be like itself [hoion auto, toioton katalipein heteron]’.


83 Balme 1987c, 291: ‘the animal develops primarily towards the parental likeness, including even non-essential details, while the common form of the species is only a generality, which “accompanies” this likeness’.
latter, we feel an oddity in treating it as a motion or change from (property) P1 to P2; it's the not surviving we would take as a change. Reproduction is more evidently such: an overall change accomplished by the organism's many particular reproductive processes. Together, these arrive at the goal-result, that the copy or offspring exists at t2. Not only is this a clearer case of change, but it’s a change that 'comes to a point' in a way surviving does not. The latter carries the organism as a whole, with all its processes together, into the goal at t2. Reproduction, by contrast, focuses the work of supporting processes into a single narrower motion—ultimately, the uniting of male and female germs—in which the copy is produced.

Several basic questions arise about this generative motion. Is there a 'moment of creation' for Aristotle, at which the copy comes into existence? Can we clearly separate—by such a creation-moment—the two phases of generation distinguished above: i) **adult x→new y**, ii) **new y→adult y**? One plausible time to place this moment would be when those male and female principles combine—when the seminal form begins to act on the fetal matter. But of course the adult x's generative motion doesn't cease here—especially not for the female x that supplies the matter. Nor does it end at the other most plausible time for a 'creation-moment', that of y's birth. The parent's tending and teaching the copy is surely still part of its own generative project, so that its making overlaps with the copy's growing.

But again our interest is not in these motions, but in the 'activity' they also are, in different aspect. Again, this activity is the organism's engagement in a species-version of a generic project. Reproducing, as the highest E that gathers all specific versions, is a genus accomplished all the time before t2. The eidetic E is to be 'at' reproducing, i.e. engaged in that project. When we see what these motions have in common in all organisms (spontaneous generators aside) we see the shape and aim of their common project.

**iii) Relating these threptic powers.** Now, about these two threptic projects, preserving and generating, we must ask: how are they telically related to one another? Does either have the other as its E—i.e. is either 'for' the other, a strategy for it, a way of carrying it out? Is it the case that preserving is for (the sake of) generating,
Preserving→Generating?

Or is generating a means to preserving,

Generating→Preserving?

I think that Aristotle clearly treats preserving as the more ultimate project, but that he can be read to do so in either of two ways, which have very different implications for us.

On the one hand he says that the individual organism copies itself because it can't preserve itself forever. Generating is a second-best, nearest approximation to true survival. DA 415b3-8: 'Since then it is impossible to partake in the eternal and the divine continually [tēi sunecheiai], because nothing perishable can remain the same and one in number, each [living thing] shares in it so far as it can, some more and some less, and it remains not itself but like itself, not one in number, but one in form.' So

Generating→Preserving/individual

—generating is for (the sake of) preserving the individual.

So the organism 'first' is for its own eternal survival; responding to its incapacity for this, it takes on a different project which can accomplish something less but alike: eternal survival by its progeny.84 We should note this special way a project is here 'for' another—not as a means to the other (which can't be had), but as a way of 'approximating' or 'approaching' it. Here the organism's generative effort derives from the project to preserve itself; it gets its goal to copy itself, from a primary goal to sustain itself.85

But there's a second way Aristotle might treat generating as rooted in surviving. It requires reconsidering a different reading of 'preserving', which I too-quickly set aside before. Let’s consider whether Aristotle treats generating as the way the species is preserved. In this case

84 So Gotthelf 1988, 129: ‘the animal is unable to preserve itself eternally, so it does the next best thing towards its preservation, it leaves behind something essentially like itself’.

85 This dependence needn't mean that the generative project is from then on subordinated to the organism's survival, however. The secondary project could assume independence, and the organism could risk or sacrifice its own survival in order to reproduce.
Generating→Preserving/species
—organisms generate in order to preserve their species. Together with

Preserving/individual→Generating
(the organism sustains itself in order to generate), this would imply (by transitivity) that individual survival is for (the sake of) species survival.86

In this case reproduction is not a second-best to survival, but survival itself, only of a different x than we had presumed—not the organism but its kind. And here the basic project isn't frustrated after all, since eternity is not only feasible but usual for species. So the one strategy is 'for' the other in a different way: not as approximator, but as an effective means. Some interpreters have read Aristotle this second way.87

These alternatives repose our original question how preserving and generating are related, into a question about two forms of preserving: is species survival for (the sake of) individual survival, or vice-versa? If the latter, and the individual is for the species, its activity of continuing itself would be only a means to that of copying itself, after all. Aristotle here faces some of the same questions as recent debaters over species selection.

Now in this way I've stated them, these alternatives differ not only in what they count as the ultimate threptic E—either individual or species survival—but in what they treat as proximately 'for' it. What that E first explains, is either the individual, or the species. In the first case the top E of surviving explains the individual, which explains the species, as 'for' making these individual organisms. In the second case the top E of surviving explains the species, which explains the organism, as for ensuring species

86 That generating is the more basic project than surviving, is suggested in DA 416b23-25, which says, in discussing feeding: ‘Since [it is] right to call everything after its end, and the end is to generate [another] like itself, the first soul would be that generating [another] like itself.’

87 Furth 1988, 161: 'looked at at the species level ... the gennetic faculty of the individuals becomes ... a threptic capacity of that eternal being (on), the species'. So too Matthews 1992, 191.
survival. At issue, it seems, is whether Aristotle thinks 'design' begins with the organism, or the species.

Stated so, there look to be strong grounds in favor of the latter. My account of the eidetic teleology has made explanation run 'down' from highest genera to species, and to individuals last and least. And surely this is Aristotle’s way: he thinks structural design takes place mainly and primarily at those higher levels. The organism inherits its organ-structure, this isn't individually caused (explained) in it by its private E of surviving. All (proper) members of a species share a type-structure that is as it is because it is generally or usually 'survivable', given a typical environment and typical material resources. Individual organisms are classified and eidetically explained only through their species-forms; if they do have 'individual forms' peculiarly their own, these must be modifications upon (differentiations of) the species-form.

But acknowledging that species-structure is explained first does not require that species-survival be the highest E. I think the key to Aristotle's view is to separate these points. The most generic project of all, lying 'furthest above' individuals, could still be the effort at individual persistence. Yet that individual persists as a variant of the species-type. So the species-plan can be (logically) primary, and individuals explained as variants on it, yet that plan still be ultimately 'for' the survival of those individuals.

I think Aristotle divides his view in just this way. He tends not to subordinate individuals to species interests.\(^{88}\) He gives pride of place to individuals, as the point of species. It's important that when he depicts 'nature' as making species eternal, it's because individuals cannot be. GA 731b33-732a1: 'what becomes is eternal in the manner in which this is possible [for it]. This is impossible in number—for the substance of beings is in the individual, and if it were such, it would be [genuinely] eternal—but possible in form. This is why there is always a genus of humans and animals and plants.'\(^{89}\) Since individuals are first substances—i.e. are, in the fullest sense—best would be their own eternity. Species are designed for eternity only under

\(^{88}\) Sometimes Aristotle speaks as if not the species but nature herself, as a substantivized and anthropomorphized principle, pursues eternity through reproduction: GC 336b30-35, and GC II.10-11 generally. But there's no room in his ontology for such an entity, and we must take these as loose expressions. See Balme 1987b, 280.

\(^{89}\) DA 415a29, GA 731b31-33; also DA 415b3-8, quoted above. Compare GC 336b29-35.
the presupposition of individual eternity as a still higher good. And individual organisms keep this ultimate E of their own eternity. They would, if they could, be gods, and Aristotle thinks that this, not their mere species-role, is their true E.

So I think we can rescue the first view—that individual survival is the ultimate threptic project—by revising it to allow that individuals don't come by this project for themselves, but inherit it in their species-form, which is more proximately designed for that E. I'll return to these topics below.

b. Aisthesis [=A]. The aisthetic power distinguishes animals from plants. It is, in a way I'll leave undefined for now, 'built upon' the threptic project, which proceeds 'beneath' it. The step is a large one for Aristotle—and so important that he’s sometimes inclined to limit life and soul to animals. Ends take a different character in perceivers: they become, as we would now say, 'intentional'.

I'll try to show that Aristotle thinks of this step (to aisthetic intentionality) primarily in these teleological terms, as a transformation in the way the organism is towards/for its ends. It now pursues them as ends, in a first way of doing so (the noetic will be another). This involves a change too in those ends themselves: both the goals of aisthetic motions, and the aims of its activities, are different from those in threpsis. Put most generally, their E is pleasure, which is the apparent good. It’s the apparent good that explains what aisthetic organisms do. (By contrast, noesis will be for—and explained by—the good itself.)

i. The aisthetic subpowers. Like threpsis, aisthesis comprises a nested sequence of more particular powers: first perception itself, more narrowly conceived, then imagination, desire, and movement (a special kind of motion). Each of these subpowers is paired with its distinctive ‘object’: what’s perceived, imagined, desired, or moved-to. Each subpower depends on the preceding one. And just as there are

90 Aristotle says this often, e.g.: DA 413b3; Sens 436b12; Juv 467b24, 469a18, b3; PA 653b22, 666a35; GA 731b4, 736a30, 741a9.

91 Here I follow especially Nussbaum 1978, 85ff, though the point goes back to Brentano. See also Caston 1998.

92 DA 431a10-11: 'To be pleased or pained is to be actual by the aisthetic mean towards [pros] the good and bad, as such.'
species that have the power of preserving but not of generating, so there are animals that can perceive but not imagine [DA 428a8-11].

In almost all cases, however, these subpowers come as a package, accomplishing the whole system of aisthetic motions, which together set animals towards ends in a quite different way than plants. For our purposes these subpowers’ separate contributions are less important than the new kind of aiming they jointly constitute. I’ll argue, indeed, that we can only find the point or aim of these separate powers by seeing their roles in this system. And we can only see the overall point of that system, by seeing how it works in animals most broadly. Still, we need to get these components before us.

i) **Perception** [aisthēsis] itself is the minimal animal power. Aristotle applies the term *aisthēsis* 1) to the whole system of animal powers, but also 2) to this ‘first’ one among them, the capacity to sense, ‘sensation’ (as aisthēsis has also been translated). Moreover, he also applies it 3) to each of the five sensory modalities, the ‘senses’ of touch, sight, hearing, taste, and smell; of these, he insists touch is primary, and shared by all animals. Finally, he applies aisthēsis not just to such powers but 4) to the activity in which they are ‘actualized’, i.e. perceiving. Perceiving is a motion that occurs principally in the sense organs, in conjunction with the heart, which Aristotle treats as the unifying source and site of perception. Perceiving consists in certain changes in these organs.

Perceiving’s motion is not a moving but a being-moved. The sense-organ is ‘moved and affected' [DA 416b33] by something external [417a4]—the S(ource) of the motion—such that the sense-organ takes on the latter's 'perceived form' [424a18]. So perceiving is the sense-organ’s being-moved from unlike form

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93 On the primacy of touch: DA 413b4-9, 414a3, 435b2-7; PA 653b24.

94 DA 428a6-7: ‘perception is either *dunamis* or *energeia*, for example sight and seeing’.

95 DA 416b33-35: ‘Perception occurs in the being-moved and affected, as we have said. For it seems to be some alteration [*alloiōsis*].’ On the heart’s centralizing role, see PA 666a11-17.
to like (i.e. like the external S’s form).\textsuperscript{96} This stands in contrast with feeding, which moves unlike matter—food—to become like (like the organism’s matter). Aristotle stresses, however, that perceiving is not merely a passive motion, or change in quality, but an actualizing of a power to be like [417b19], already in the organ.

Perceiving is always of a ‘perceived’ \textit{[aisthēton]}, its object: this is the S that initiates the motion in the sense-organ. So the perceived is (e.g.) the red of the apple, which causes the reddening in an eye. As a perceived, this red exists ‘potentially’ (as power) in the apple, but it has its ‘activity’ [energeia] in that reddening, hence in the sense-organ [DA 426a2-26]. Its activity lies in its moving (causing) the eye to be red and alike, an achievement that happens in the eye.

This motion in the eye is the activation not only of the red thing’s power to move, but of the eye’s power to be moved—its power to take on sensible forms.\textsuperscript{97} As activating this power of the eye, the likeness (e.g. redness) counts as a ‘percept’ \textit{[aisthēma]}. Even though the eye’s power is for a passivity (for being acted on by something else), it of course has a point or aim. But we can only see what this ‘becoming-like’ is for, by turning to the other aisthetic powers.

ii) \textbf{Imagination} \textit{[phantasia]} is a power for a further motion, beyond perception's and depending on it. Imagining depends on a prior perceiving, because it is a repetition—with differences—of that motion in the sense-organ, a repetition that can occur in the absence of perceiving’s external S.\textsuperscript{98} So, for example, it is the eye’s becoming red again, similarly to how the apple had made it; this involves not a percept but an

\textsuperscript{96} DA 418a3-6: ‘the perceptive [power] is potentially what the perceived is actually…. While it is being affected it is not like, but having been affected it is likened and is like that [perceived].’

\textsuperscript{97} See DA 417a10-418a6 on perception as potential or active. In sum: the red’s power to be seen is activated in its being seen, which occurs in the eye and coincides there with the seeing of it, which activates the eye’s own power to see. (I here use ‘activate’ where the more usual choice would be ‘actualize’; this is for consistency with my rendering of \textit{energeia} as ‘activity’.)

\textsuperscript{98} DA 429a1-2: ‘imagination would be motion occurring through perception in its activity’. Also DA 428b10-17. DA 425b24-25 locates \textit{phantasiai} in the sense organs.
image [phantasma]. Aristotle’s usual example of imagining is dreaming.99

With this scenario and example, the S(ource) of imagining’s motion seems to be that prior perceiving. That sight of red—itself an impact from the red perceived—seems to send ripples through the organism, after-images of its red. Imagination seems simply a power to undergo these ripples. However, I think this leaves out a more active and aiming role Aristotle gives this power. Although such stray after-images will count as imagining, its main cases are those in which the animal revives and uses these images to some purpose. So imagining is mainly explained not by the percept, but by an active power to make images from that percept. DA 427b17-20: ‘for [imagination] is an affect up to us [eph’ hêmin], whenever we wish (for it is possible to create something before the eyes, like those setting out mnemonics and creating images).’

Although imagining can use images in many ways,100 I think one use is most important. Imagination mediates between perception and desire; it ‘works up’ the percept in a way that prepares it for desire. Imagining makes that perceptual content ‘appear’ in some way that can allow desire to attach to it.101 In the fullest and simplest case, imagining makes that content appear good—i.e. it makes it pleasant. More generally, imagining makes a content ‘appear’ as bearing on the animal’s purposes. It has been plausibly argued that Aristotle attributes intentionality to imagination, though not to perception.102

When we see that this is imagination’s most important work, we see (first) how it can work even while perceiving goes on: while the apple is present, the percept of red gets converted into an image, as this

99 DA 428a8, De Ins 459a18.

100 See Frede [1992, 285f.] on imagination as retaining images that set what’s now perceived into its context or situation.

101 Here I follow the broad line of Nussbaum 1978, 255-65; see also Richardson 1992, 385. DA 433b28-29 says that imagination is a prerequisite for desire; DA 429a5-6 and 433a10-12 cite its role in guiding animal action.

102 Nussbaum 1978, 255-61; Caston 1998. DA 420b32-33 says that imagination is a prerequisite for ‘voice’, as sound with meaning [sêmantikos]. By contrast Everson [1997, ch. 4] argues that all perception involves this ‘appearing’.
red is taken as pleasant. But we also see (second) how imagination’s ability to work in the absence of the perceived is important: this permits it to steer desire towards absent objects.

iii) **Desire** [*orexis*] is a power for yet another motion in this sequence—a motion whose (kinetic) S(source) is an imagining [DA 433b28-29], and which is in turn the S for the animal's bodily movement. Desiring changes the image of an apparent good, into something that directs movement. So it plays a pivotal role in this animal teleology: 'all desire is for something' [DA 433a15].

Here we are concerned with desire as appetite [*epithumia*], not choice [*boulēsis*], which belongs rather to noetic life. In the latter the role of perception-and-imagination is taken by reason. But in animals (and humans insofar as they are animals) this discriminative or orienting role is played by imagination, which makes the perceived—e.g. the apple—appear good. Appetite turns the organism’s effort towards this apparent good.

Desiring likewise has its object, the 'desired' [*orekton*], which is the apple as the ultimate S(source) of this desire. It is the apple as a power to produce that desire, a power that it has by virtue of its exercising the other two powers we’ve seen, to induce a percept as red, and an image as apparently good. This *orekton* is the more distant S of the desiring, but the imagining is the proximate S. And desire itself is the power to turn the image into a motivator or spur to movement.

iv) **Movement** or ‘locomotion’ [*kinēsis kata topon*, literally 'motion with respect to place'], is the final motion in this sequence, the animal behavior that desire brings about. It is not, strictly, 'spatial motion'—thought of as through a Euclidean or Cartesian space—but motion to the 'place' of its desired goal.

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103 DA 428b25-30 shows that imagination can accompany perception.

104 DA 433b17-18 says that a desire is a motion, which is moved by the doable good [*praktos agathon*], and in turn moves the animal; I take it that it is imagination that delivers this ‘doable good’. MA 701a4-6: ‘For the animal moves and traverses by desire or choice, some alteration having occurred by perception or imagination.’ In DA 432a29-b4, near the start of his account of the power of movement, he recapitulates the other powers as the threptic, the aesthetic, the imagining, and the desiring.

105 DA 432b5, 433a23.
its limit [peras] or resting-place.\textsuperscript{106} We should take it to include not just movement of the whole body to a place (e.g. by walking), but the movements of limbs, digits, and other parts moveable by desire. So it includes not just walking to the apple, but moving the apple to the mouth. Aristotle thinks these bodily movements begin in the heart, the aisthetic control-organ.\textsuperscript{107}

Of course the analogue to perception, imagination, and desire is not this movement itself, but the power or \textit{dunamis} for it. That there is such a power needs saying, because it is tempting to treat desire as itself, immediately, a power for the movement. But Aristotle clearly distinguishes a separate subpower, which we may think of as the animal’s bodily or muscular skills for effecting desire. These skills importantly involve abilities to coordinate movements ‘in the light of’ perception, imagination, and desire.

Animal movement’s radical difference from plant growth lies not in its speed or range, but in its being guided by those other subpowers: these set the limit or goal, and aim the movement. So DA 432b15 denies that the source of animal movement could be the threptic power, 'for this motion is always for something, and is with imagination and desire.'\textsuperscript{108} That is, it is ‘for’ something in a fuller or stronger sense (than threptic motions are), by virtue precisely of being guided by those other powers.

Like the other subpowers, movement has an object, which Aristotle calls the ‘practical good’ [\textit{prakton agathon}], i.e. the doable good. It is, for example, the apple again, but in another aspect: not as seeable or imaginable or desirable, but as eatable—as something that can be ‘done to’. Here again Aristotle treats this as the ultimate S of the motion, its action mediated by desire as a more proximate mover.\textsuperscript{109}

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\textsuperscript{106} MA 700b15-16: ‘For all animals both move and are moved for something, so that this is the limit of all their motion, the for which.’ (Or of course movement can be aversive and \textit{away} from a place. DA 428b28-29 says that animal movement is always either pursuing or avoiding.)

\textsuperscript{107} PA 666b15.

\textsuperscript{108} DA 433a21-26 argues that movement requires desire as its mover, and that thought cannot replace it. See also 433b16-18.

\textsuperscript{109} DA 433b10-13.
ii. **Relations among the subpowers.** Now, of these four main components of animal or aesthetic
life, i) and ii) form one pair, and iii) and iv) another. Animals’ aesthetic power first identifies or recognizes
pleasant things—by perception and imagination—and then moves to secure them—by desire and
movement. We can see these as the theoretical and practical components of aisthesis. They are also the two
main powers of animal soul that Aristotle distinguishes at DA 432a15-17: the discriminative [*kritikos*] and
the movement-causing.

One large issue I’ll note and set to the side. This is the key question how these theoretical and
practical parts are related teleologically. At first, there seems no doubt: the answer seems clear from their
very order. Won’t the sequence we’ve just reviewed reach its highest end at its conclusion, in its last
member? So the theoretical will be for (the sake of) the practical, a preparation or instrument for
‘locomoting’, i.e. for acting in and on the world. The aesthetic subpowers will stand in this telic order:

**Perception → Imagination → Desire → Movement,**

each preparing for the work of the next. And we might all the more expect movement to be the final end of
aisthesis, if we suspect this whole aesthetic project is subordinate to threpsis. Movement will then serve the
threptic aims of surviving and reproducing, and the perceptual system will supply data for this movement.

However, the telic logic of aisthesis is not as clearcut as this suggests. There is also a
countertendency in Aristotle, a tendency to make theory the real point. And indeed, the mere order of these
subpowers doesn’t really require that the last be the end. The overall point might come at the beginning,
and later powers serve it: movement could be for (the sake of) more adequately perceiving. And that it
might be, in Aristotle’s view, is encouraged by considering aisthesis in relation not to threpsis, but noesis. If
the aesthetic power is really ‘for’ noesis—if it is noesis and not threpsis that explains aisthesis—then we
might expect the theoretical side to be primary within that subpower itself.

Because the ‘internal’ telic relations of aisthesis (i.e. among its subpowers) depend partly on its
‘external’ telic relations to threpsis and noesis, I won’t yet try to decide them. But there are other aspects of
these subpowers’ relations to consider here.

We’ve seen that Aristotle allows that some animals can lack one or more of these subpowers. But such animals are recognizably incomplete, missing parts of a proper whole. The subpowers are virtually interdefined, and can only be themselves with one another. DA 414b4-6: ‘whatever has perception has pleasure and pain and the pleasant and painful, and whatever has these, has appetite, for this is desire of the pleasant.’ Aristotle’s notion of aesthesis as intentional involves all of these subpowers together: the ‘appearing-as’ in imagining, is essentially a preparing of some perceptual content for use in aiming orektic movement. And his notion of aesthesis as a new order of kinetic teleology, also depends on them all: the animal’s movements are ‘for’ the goals that desire, guided by perception and imagination, sets for them.

In analyzing this new kinetic teleology—how orektic movement is for (explained by) ends—we should especially ask whether it involves a kind of ‘preview’ of the end, a look ahead at it. Such a ‘look ahead’ would of course not involve literally seeing into the future, but having a representation that refers ahead to it. If the aesthetic animal does, in some way or other, represent or intend a future result, and orient movement by it, this would give that result a kind of causal presence in advance of the motions ‘towards’ it. And this would answer a basic doubt I think we have about teleology, as ‘explaining by ends’. It would help to legitimate kinetic teleology, in the case of orektic movement at least.

However, Aristotle’s view is divided here. He often suggests that animals do ‘look ahead’, but is also inclined to think that in a stricter sense only humans can really consider (refer to) the future. Let me go back through the subpowers in this respect.

i) Aristotle seems to attribute such a preview to perception itself, when he says that the distance-senses (smelling, hearing, seeing) give a ‘pre-perception’ [proaisthēsis] of food-to-pursue and harms-to-

110 Also DA 413b22-24: ‘but if perception, also imagination and desire, for where there is perception, there are pain and pleasure, and where these, by necessity also appetite.’

111 Contrast Freeland 1994, 41ff., arguing that animal action is explained by an objective, not an intentional good.
avoid [Sens 436b20-21]. But I think in his stricter view of perception he would deny that these senses give any such preview by themselves. Their perceived-objects—the apple’s seeable red, for example—are temporally present, though spatially distant. Indeed, they’re spatially distant only as power, since as we’ve seen the activity of that seeable red is in the eye. In either case it's temporally present colors, motions, etc. that are perceived; perception isn't of the future.112

ii) Imagination has a stronger claim to be genuinely futural, but again I think Aristotle has doubts. Its most important work, we’ve seen, is to change some percept into an image, of the object as pleasant (or painful), and so to prepare for desire. But just how does this work? Does imagination image the object as a future pleasure it can enjoy? We might expect that it’s precisely this projection of the pleasure that lets us desire it: imagination takes the old percept of the apple-red, and uses it to image a new apple it could have. Imagination does play this role in humans, Aristotle thinks. But he has doubts whether animals can really refer their images to the future—as we see from his treatment of desire.

iii) Desire may seem necessarily futural, but Aristotle denies that it is—when it occurs in its animal or aesthetic form, as appetite (epithumia). When it takes its object from perception and imagination, in the absence of thinking, it too is temporally immediate: ‘desire commands by what's present [τὸ ἐκέτε], the present pleasure appears altogether pleasant and altogether good, because what's to come [τὸ μέλλων] is not seen’ [DA 433b8-10]. Presumably Aristotle here means by a ‘present pleasure’ a pleasure the animal’s senses inform it can be immediately enjoyed. It sees either an apple, or a sign that an apple is nearby; it images this apple as both present and pleasant, and desires it as such. The pleasure of eating it does ‘lie ahead’, but still within an ‘extended present’, of what the animal can do with what it now perceives.113 So

112 As power, they might rather be past, the external S when it started the motion that affects the organ. See DA 434b27-435a10 on how the perceived object transmits a motion through the medium (e.g. air) to the sense organ.

113 The alternative is that the pleasure lies in the present perception of the apple, but this is ruled out by NE 1118a18-22: ‘dogs do not delight in the scent of hares but in the flesh … nor the lion in the voice of the cow but in the meat; but it perceives that [the cow] is near through the voice, and so appears to delight in it’.
animal desire does ‘look ahead’ to pleasures not yet enjoyed, but only to pleasures possible from the present objects of its distance-senses.  

iv) Movement will take its temporal scope from that of desire. An animal’s bodily capacities can only reach out as far as the outcomes its desire projects. And since its desire can only reach things it can do with what it presently perceives, its movements can extend no further than that. DA 434b25-27 says that animals able to ‘traverse’ [poreutikos] must have the senses beyond touch, to perceive ‘from afar’ [apothen]. And in the absence of reason, I think he holds, these distance-senses set the horizons within which animals move.

So Aristotle expresses reservations about the ability of animals to intend future goals. Nevertheless we can see that the aisthetic subpowers together do allow a limited reach ‘ahead’, though only to pleasures it can take in things it perceives or images as present. This very limited reach towards a future goal will be extended and perfected in noesis. But even here it begins to give a certain legitimacy to Aristotle’s explanations by ends. The E—the pleasure in eating the apple, in which the movement ends—has a kind of presence in advance of its explananda (the movement), even if not in a full-fledged representation of that future outcome. The E explains, not by the animal imaging it, but by its imaging the present thing from which it can take this pleasure—and by its having the practical power to use that image to accomplish E.

The problem, however, is that this only rescues a small part of Aristotle's teleology: its explanations of (intentional) animal movements. And this limited scope calls into retrospective discredit all the other teleologies we've mapped so far, which have lacked this intentional structure. The threptic version of kinetic teleology, as well as the hyletic and eidetic teleologies, seem not susceptible to this analysis.

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115 NE 1141a28: 'we say that some even of the brutes are intelligent, those appearing to have a power of forethought [pronoëtikôn] about their life.' Compare Caston 1998, 290-91 on how Aristotle's account of imagination-based intentionality 'could explain the ability of higher animals to anticipate events on the basis of past experiences without having to attribute concepts to them'. (But while Caston shows how imagination may strip perceptions of their past referents, he doesn't say how they get projected forward.)
Indeed, we've seen that this intentionality is not even true of aisthetic processes individually (the eye-jelly doesn't desire to take on color), but only in aggregate. Aristotle tries to explain hosts of xs by Es, while explicitly denying that these xs are due to animal, human, or divine intending. Whereas we suppose teleology begins with intentionality, Aristotle thinks it only changes form.\textsuperscript{116} I return to these problems in §5.

\textbf{c. Noesis [\textsuperscript{N}].} The noetic power distinguishes humans from other animals—which, in their lack of it, are mere 'brutes' \textit{[thêria].} At times Aristotle blurs this boundary by attributing elements of the noetic power to some 'higher' animals; but only humans (and gods) have the main part. This power allows humans to grasp a ‘universal’ \textit{[katholou]} or essence, whereas brutes are related only to particulars. Once again Aristotle uses the same term—\textit{nous}—sometimes for the overall power, and sometimes for a subpower within it (though he also has other terms for the overall power, in particular \textit{dianoia, ‘intellect’}\textsuperscript{117}). We should again distinguish between the power (\textit{nous}) and its activity (\textit{to noein}); I’ll call these 'thought' and 'thinking'. Just as the aisthetic processes depend on the threptic ones continuing ‘beneath’ them, so—in us—thinking depends on both of those other processes, in ways we will try to detail.\textsuperscript{118}

Like perceiving, thinking involves a motion, whose special logic involves a new kind of kinetic teleology. We saw that perceiving’s motion is already 'intentional'—it is ‘towards’ its objects by noticing, interpreting, and evaluating them. Thinking takes up and furthers this aspect. It furthers in particular how far or fully this intentionality has a ‘preview’ of the future end. Aisthetic intending, we saw, has only a limited and ambiguous ‘foresight’ of the E its movements are towards. Noetic intending achieves a more


\textsuperscript{117} Some of the terms by which Aristotle distinguishes this overall capacity: \textit{dianoêtikon kai nous} [DA 414b18]; \textit{logismon kai dianoian} [415a8]; \textit{noêtikon} [415a17]; \textit{noein kai phronein} [427a19]; \textit{gignôskei kai phronei} [429a10-1].

\textsuperscript{118} Indeed, the noetic is so dependent on the aisthetic, that Aristotle treats elements of the former as versions of the latter; e.g. rational ‘wish’ is a version of desire.
complete or adequate reference to future goals—which involves a change too in those goals. Its more adequate reference lies in its representing its goals in reasons [logoi], not just in images. (So strictly speaking it refers to these goals not in a ‘preview’ of them, but in a non-perceptual, non-imaging reason about or for them.) And the goals it sets in this way are no longer pleasures—apparent goods—but real or genuine goods, or even ‘the good itself’. Our main challenge is to analyze this noetic way of being towards future Es.

1. The noetic subpowers. Like perceiving, thinking is a complex motion, which Aristotle attributes to several interacting subpowers, one of which bears the name of the generic project. These noetic powers are listed at NE 1139b16-17 as ‘craft [techne], understanding [epistémē], mind [phronēsis], wisdom [sophia], thought [nous]’. Like the aisthetic subpowers, they are broadly divided into theoretical ([a] thought, [b] understanding, [c] wisdom) and practical ([d] craft, [e] mind).119 This parallel division suggests that noetic aiming might have the same broad logic as aisthesis seemed to have—with the theoretical powers serving the practical powers. In this case the overall Es of noesis would be the goals of the movements in which those powers culminate. Let’s quickly bring these noetic subpowers before us.

The theoretical powers treat things that are universal and necessary. They treat things not as particulars, but in their kinds or forms or essences. And, of course, they treat them without a view to changing them. However this does not mean, I think, that theory treats things in a value-neutral way. These theoretical powers principally function to pick out the ultimate and general Es, which the practical powers will then turn into objects of pursuit. It is thought, understanding, and above all wisdom that supply us with our Es of human virtue and happiness, which craft and mind then put into action. So Aristotle rejects the boundary that might seem more natural, between theory as factual and practice as valuative.

a) Thought [nous], narrowly conceived, is the subpower that grasps the sources [archai], from

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119 NE 1139a12 distinguishes between two rational parts, the scientific [epistēmonikon] and calculative [logistikon], the latter of which 'deliberates'; shortly later [a27-28] the contrast is between theoretical and practical.
which (understanding’s) demonstration by deduction can then proceed. These starting-points are definitions [horoi], for which there exists no reason (logos) [NE 1142a25-26; also 1143b1]: they cannot be deduced from anything prior. Instead these definitions must be arrived at by induction [epagôgê]. So thinking, the activity of this subpower, is the motion of inducing these definitions. And the latter, the products of that motion of thinking, are its thoughts [noêta]. These serve as the ultimate reasons employed by the other subpowers.

Here thought plays a role within noesis analogous to that played by perception within aisthesis: it delivers a certain ‘given’ or starting-point, upon which the other subpowers will then work. It delivers a new kind of starting-point—new in its ontology, and new in the kind of sequence it begins. Thinking gives universals or essences, not perception’s particulars. And it gives them as reasons, that explain, and that start off chains of further explaining reasons. Thinking ‘gives’ these universals in its thoughts ‘of’ them, which Aristotle thinks of by analogy with perception, as a ‘being-affected-by’ the universal. (So, familiarly, in DA III.5 he includes in our cognitive power an ‘active intellect’—i.e. a part of nous that somehow already is or has these universals, and can affect the other part of nous with them.)

Thinking delivers these universals not by an act of ‘intuition’, as often supposed, but by a process of induction. APo II.19 describes this inductive process—how it advances beyond animal perception of particulars, by first retaining its content as ‘memory’, and then generating from multiple memories a single logos of what is common to them. Although it goes beyond aisthesis, this process obviously depends on

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120 APo 100b5-17 and NE 1140b31-1141a8; also NE 1139b28-31. Compare APo 72b18-25.

121 We'll see that Aristotle also recognizes a quasi-perceptual relative of this power, as playing a crucial role in practical reasoning; e.g. NE 1143b1.

122 Aristotle stresses the analogy between perception and thought e.g. at DA 429a17-8.

123 Barnes [1993, 268] argues for this connection between nous and induction.

124 Met 981a5-7 attributes this step to craft, but I think is consistent with Aristotle’s locating it in the thought that is a precondition for craft.
perception and on imagination; memory is indeed a kind of imagining. Thinking’s motion begins from theirs, but makes a new thing, a reason (for believing or acting)—which perception and imagination themselves give no reasons for.

Here we are describing the basic and primitive form of induction, in which it arrives at universals in the first place. But this behavior also occurs in much more developed forms, above all in the person of Aristotle’s biological researches themselves. (So we arrive, within his biology, at its explanation and vindication of itself.) A certain part or phase of these researches is a high-order exercise of this inductive nous: the phase in which Aristotle pursues the ever-higher (and broader) kinds to which organisms and their features belong. Lennox [1987a] has analyzed convincingly this ‘pre-demonstrative’ phase in Aristotle’s biology. He thinks it is the particular job of History of Animals: far from being the mere mass of raw data it was often supposed, this work constantly looks for the broadest kinds in which particular traits are shared. So it prepares for explaining those traits, the job of the other biological works.  

This inductive, noetic phase in Aristotle’s biology aims at definitions of the general kinds of organisms—at identifying the higher and higher ways they are common or similar. Aristotle uses (hyletic) parts and (kinetic) sources as clues to these definitions, but the definitions themselves refer to the activities or ‘lives’ these parts and sources are (explained as) for. (So the bird’s wings, and the processes that have made it able to fly, are explained by its flying.) Moreover, these lives are interpreted telically, as projects (so that the bird’s flying is an activity with a point). As inductive thinking develops to the level of Aristotle’s science, it arrives at the reasons that most or best explain. The ultimate task of inductive nous is to discover these basic life-projects.

b) **Understanding** [epistêmê] is the subpower that carries out demonstration [apodeixis] by

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125 Lennox argues [1987a] that Aristotle uses *historia* to refer to this pre-demonstrative phase of science.
Its activity is the motion of demonstrating or syllogizing. So thinking and understanding are sequential motions, in the way we found perceiving and imagining to be. Like imagining, understanding converts a content supplied by a receptive power: it takes up the definitions arrived at by thinking, and uses them as first premises to deduce further results. It converts those thoughts into reasons, to explain further things—which it thereby understands. Its products are those demonstrated results, its ‘understoods’ [*epistêta*].

Like thinking, understanding is exercised at a range of levels, running from the most primitive and everyday, up to Aristotle’s own scientific practice. We use it whenever we explain. But again Aristotle thinks he exercises this general power at a higher level in his biology: in the phase of his biology that uses the grasp of organisms’ higher kinds, to explain why individuals or species are as they are. So whereas *History of Animals* is an exercise of inductive thinking, explanatory understanding is primary in *Parts of Animals*, *Generation of Animals*, and *De Anima*. It works especially at the eidetic explanations we’re now surveying—which explain organisms’ parts, generation, and forms by deriving them from the most general kinds of organic life.

In §2 we saw that these eidetic explanations do not run down through a single ‘Linnaean’ classification of organisms, but instead through multiple, overlapping ‘differentiae’.* So e.g. the bird’s heart is explained by the role of this part in the kind ‘blooded’, whereas its wings are explained by their role in the kind ‘flyers’; cats belong to the first kind but not the second, bees to the second but not the first. So the kinds that explain different parts of an organism are not always ‘nesting’.

How do syllogisms figure in these explanations? They trace the links in this eidetic teleology. In

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*126* So it is *hexis apodeiktikê* [NE 1139b31-2].

*127* Because the main force of *epistêmê* is explanatory rather than justificatory, I think it’s better translated ‘understanding’ than ‘knowledge’.

the primary case, a syllogism explains the presence of some feature, in the broadest kind to which it belongs, by its role in the ‘life’, the essential or defining activities, of that kind.

i) feature F is needed for life L [all L has F]

ii) kind K lives life L [all K has L]

so iii) kind K has feature F [all K has F]

Here the explanandum is K’s possession of F (a part, a behavior, a source), where K is the broadest kind that has F. And the explainer is, in particular, the insight how F is needed for K’s distinctive activity—it’s the role F plays in that general kind of life. There’s also a second kind of eidetic syllogism, which applies this primary explanation to more particular kinds. It explains F’s presence in some sub-kind, by the latter’s membership in K.\footnote{These two kinds of eidetic explanations are related to Lennox’s [1987a, 93-6] ‘type-B’ and ‘type-A’ demonstrations, respectively; he argues for the priority of the former.}

So it begins with the conclusion of the prior syllogism:

i) kind K has feature F [all K has F]

ii) kind K* belongs to kind K [all K* is K]

so iii) kind K* has feature F [all K* has F]

Here the explainer is the insight how K* belongs to a broader kind of organism (that needs F for its living).

c) Wisdom [sophia] stands in a different kind of relation to the others: it is thinking combined with understanding, with respect to the most valuables [timiòtatôn] [NE 1141a18-20,b2-3]. It is those other powers operating at their highest level—in which thought delivers the divine and ultimate content, as premise for an all-encompassing deduction. Aristotle stresses how this shifts the individual’s interest from specifically human and individual concerns, to divine matters [NE 1141a33-b8].\footnote{Compare Met 981b10-982a1.} Wisdom’s interest in the highest (most valuable) is in it as highest. So it involves an evaluation of what it studies—it studies it as the good or best.
Once again this noetic power plays a key role in Aristotle’s own theoretical system—and even a key role in his biology. For the good that wisdom grasps, though it transcends the goods of all organisms, including the human, still serves to explain those biological goods, in a way we will examine in §5. We’ve seen that the eidetic teleology explains by citing the general ‘lives’ or ‘projects’ of organisms—ultimately the thrpeptic, aesthetic, and noetic projects we’re now surveying. Each of these projects involves a certain good or goal. Aristotle will try to explain these goods, by citing the highest good that wisdom gives. Ultimately, it’s the divine activity that explains all organisms’ lives, Aristotle thinks.

Turning now to the practical powers, these are concerned with ‘what is able to be otherwise’ [NE 1140a1]. They deal with their objects precisely as able to be otherwise, i.e. as subject to change by the agent’s own effort. These powers constitute the ‘practical intellect’ [dianoia praktikê] [DA 433a18]. Like the theoretical powers, they deal with ‘reasons’, but now these are reasons for doing, not for believing. So the logos is not an explanation but a motivation.

d) Craft [technê] is ‘a state able-to-make [poiêtikê] with a reason [meta logou]’ [NE 1140a7-8]. Its activity is the motion of making, and its product is the made [poiêton]. It differs from experience [empeiria] in how it makes: craft operates with a ‘universal judgment about similars’ [Met 981a6-7]. That is, it orients its making by a thought of the kind of thing it is trying to make, a thought it has induced from similar particulars. Craft refers to the product as a ‘form’; so Met 1032a32-b1: ‘from craft come to be those things whose form is in the soul’. (By contrast an aesthetic movement is directed towards some particular it perceives as present.)

This technê applies most obviously to cases in which something is literally crafted or made. But I think we should hear it to apply more broadly wherever some change is effected in things outside the agent. The agent gives external matter a new form, whether by crafting an ‘artifact’, or by ‘shaping the situation’—changing the environment in any respect. To be sure, to count as craft that new state must be aimed at as a form, i.e. under a universal expected from similar cases. Craft aims to effect some kind of
change in things.

e) Mind [phronēsis]\(^{131}\) is a state able-to-act [praktikē] with a reason, or 'a true state able-to-act with a reason concerning the goods and bads for the human' [NE 1140b5-6]. It differs from the aesthetic way of aiming behavior, by its power to deliberate [bouleuesthai], 'well-aimed by reasoning, at the human best' [NE 1141b13-14]. Its activity is ‘minding’—which we should hear as a reasoning how to act—and its product is the action [prakton].

How does acting differ from making? We might have taken acting to include all the things we do other than (literally) crafting products—but have already seen that craft extends widely to all the ways we change things around us. We must understand phronēsis as a complementary power to work on oneself. It controls behavior not with respect to how external matter is moved, but with respect to what the agent is doing as an agent. We should see ‘the same behavior’ as aimed or controlled in both of these aspects. Noetic intending sets itself a mark in both of these ways: there is a way it is trying to make the world be, and a way it is trying to be, itself.

These two practical subpowers are distinguished by where they are actualized, i.e. where the products of their motions occur. Making [poiēsis] is ultimately a motion in the thing made, whereas acting [praxis] culminates in the doer. More deeply, these subpowers are distinguished by their ends-logic: making has an E different from itself (and at which it ceases), while acting is its own E [NE 1140b6-7], and hence not really a motion after all.\(^{132}\) Craft aims at the outcome of the motion it begins in things, but mind aims at a meaning present in what’s now done. It doesn’t try to change one into a better person, but to be the best now.

\(^{131}\) To use ‘mind’ for phronēsis we must hear it a certain way: not, of course, in the Cartesian sense as an immaterial substance defined by consciousness. Instead ‘mind’ must name a power lodged in a body, the power to ‘mind’ its activity a special way.

\(^{132}\) Aristotle marks this as a basic difference in ends near the start of NE: 'for some are activities, some are functions [erga] apart from these' [1094a4-5].
Craft and mind are alike, in that both direct their processes by reference to a reason or *logos*. This reason plays the primary role, I suggest, of picking out the end of the noetic aiming: it refers ahead to the E, the good. These practical powers are then able to take this reason not (as understanding does) as a reason for believing, but as a reason for doing. PA 639b17-19: 'For the doctor and the builder, by defining health and the building either by intellect or by perception, can give the reasons [*logous*] and causes [*aitias*] of each thing they make, and why [*dioti*] it is to be made [*poiēteon*] thus.'

As I’ve said, the practical subpowers get their aims or reasons from the theoretical subpowers, which are not simply factual, and don’t desist from valuing. Thinking and understanding are mainly concerned with ‘life’—with organisms belonging to kinds defined by their pursuit of certain projects or goals. We understand a biological kind when we understand its defining activity. In particular, we understand the human kind only by identifying its distinctive life-project—that we are essentially trying to be. To be sure, the ends or values studied this way are all ‘internal’ to the biological kinds defined by them. So far, the human good is only a good for humans. But Aristotle’s theory aspires to transcend this relativization of ends and values. By the exercise of *wisdom*, he aspires to think and understand ‘the best’. And we’ll see the repercussions this has for the status of those seeming ‘internal goods’.

But let’s turn to what craft and mind do with the Es they receive from the theoretical powers. They convert them into a new kind of reason, generating a new kind of syllogism. These syllogisms connect the reason with more and more particular things ‘to be done’—until at last they arrive at something that can immediately be done. This reasoning ‘downward’ or ‘backward’ from the E may lead through earlier and earlier stages in an action-plan, but it can also take a non-temporal form—and reason e.g. from some general

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133 Hence Aristotle refers to the intellect that treats changeable things as 'calculative' [*logistikon*]. It calculates by reasons anticipating the E.

134 Note that Aristotle sometimes says a *logos* is present in all natural processes, e.g. in the sentence immediately before: '[The for something] is the reason, the source alike in things composed through craft and by nature.' [PA 639b15-17] But I think more often he restricts such a *logos* to human rationality; see e.g. Met 1046b5-24.
specification of what’s to do, to more specific ones it knows how to enact.

These practical syllogisms are reasoned out in deliberation \textit{[bouleusis]} which results in choice \textit{[prohairesis]}. Mind is the power to deliberate [NE 1140a25-b6, 1141b8-14, 1142b31, Rhet 1366b20], and to deliberate with respect to ‘living well, overall’ [NE 1140a25-31], the best [1141b13, 144a32-3], happiness [Rhet 1366b20]. Deliberation then works back from this to a doable action, and choice fixes on this.

These practical noetic subpowers convert thought’s reasons into reasons for acting. But they are not enough, by themselves, to set in motion the bodily power of movement. For this they rely on one of the aesthetic subpowers, desire.$^{135}$ DA 433a22-5: ‘But thought is never found moving [to action] without desire (for wish is desire, and whenever it moves according to reasoning \textit{[logismon]}, it moves according to wish)’. Craft and mind change the character of desire, turning brutish appetite \textit{[epithumia]} into wish \textit{[boulêsis]}. It’s wish that dictates to the power of movement, i.e. the muscular abilities.

\textbf{ii. The structure of noetic ends.} We should consider two large issues about this noesis. First is the way it differs from aisthesis as teleology—i.e. the different way in which \textit{ends explain}, within it. Second is what its goal or point might be—and which of the noetic subpowers most projects it. (In particular, does the point lie in theoretical \textit{nous}, or in practical \textit{phronêsis}?)

1) By grasping a form as a reason, noesis can intend the end in a fuller sense than we saw aisthesis was able to do. As craft, it intends the end as genuinely ‘ahead’, and reasons back from that outcome to its doable means. So Met 1032b6-9: ‘The healthy [patient] comes to be from [the doctor] thinking thus: since health is this, it is necessary if [the patient] will be healthy [that] he will be this, e.g. uniform [in the body], and if this [will be], [that he will be] warm; and [the doctor] thinks always thus, until [he arrives] in this last [thing] that he himself can make.’ (Also 1032b18-26.)

$^{135}$ NE 1113a: ‘choice would be deliberate \textit{[bouleutikê]} desire of things up to us; for when we have decided as a result of deliberation, we desire in accordance with our deliberation.’
Practical thinking 'previews' its E more adequately than animals can do. It is more genuinely proleptic, more able to refer to the future, than the aisthetic intending. We've seen Aristotle's doubts whether animals look ahead at all. His analysis of deliberation stresses how it fixes its E at a temporal distance from itself, as the wished [boulëton], and deliberates backwards from it to something presently doable—which choice then enacts. Aristotle builds this prospect into his notion of choice [prohairesis—literally 'pre-grasping']. NE 1139a31-32: 'Choice is the source of action—the motion's from-which, not its for-which—and the source of choice is desire and a reason for something [logos ho heneka tinos].

Similarly, craft guides its making by an eidos prohaireton of the product-to-be.

Practical thinking not only makes its E more explicitly futural, it also has a truer E than aisthesis. The aisthetic E, pleasure, is in fact a distorted or garbled version of the noetic E; it's just the way the latter 'appears', to animals not capable of thought's transparency to the good. Practical thinking has as its ultimate wished(-for) the human good. But this E can only be intended through a universal concept, not by images of particulars; as restricted to the latter, aisthesis can't have this E as its object.

2) As with the aisthetic subpowers, we should ask how the noetic subpowers are related telically. Do the theoretical serve the practical, or vice versa? Again I can only broach the question, since answering it depends on examining the 'external relations' between the whole noetic power and the threptic and aisthetic ones.

As in aisthesis, the first appearance is that the theoretical subpowers must serve the practical. For again this is suggested by the sequence of motions—by the way that thoughts get further processed into reasons for acting: we expect that the point must come at the conclusion of the overall motion. It seems

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136 Some brutes are said to be intelligent, those 'that seem to have a power of forethought [pronoëtikê] concerning their life' [NE 1141a26-28].

137 DA 431b7-8 says that thinking 'reasons and deliberates what's-to-be [ta mellonta] with respect to the present [pros ta paronta]. See also MA 701a20-22, Met 1032b6-9. —The end that is the intentional object of choice's reason, is of course also a source: 'The sources of actions [prakta] are their for which.' [NE 1140b16-17]

thought, understanding, and wisdom would have the ultimate point of setting our sights for action. Perhaps they are incomplete or inert by themselves—as we might hear NE 1139a35-36: 'Thinking itself moves nothing, only [thinking] that is for something and practical.'\textsuperscript{138} If theory serves behavior in this way, its ultimate E would be whatever is behavior's goal. In this case it seems we should have:

\textbf{Wisdom $\rightarrow$ Thought $\rightarrow$ Knowledge $\rightarrow$ Mind $\rightarrow$ Craft.}

So wisdom finds by induction the ultimate E (divine perfection); then ‘lower’ thought and understanding find the application of this E in organisms and especially humans; then mind connects the human E with ways of acting (regarded as expressions of character); finally craft infers from these ways of acting to ways of working on the world—and sets the body in motion.

But the problems with attributing this telic ordering to Aristotle are more obvious than they were within aisthesis. Familiarly, Aristotle sometimes denies that theory properly serves practice. Theoretical noesis can and should (in the best case) be autonomous, not just turned to practical use. This autonomy is complete in the divine, which lacks aisthesis, and has only the theoretical arm of noesis [NE 1178b8-22]. In us, thinking can't be so thoroughly self-sufficient. Its exercise depends on our using practical reasons to direct our aesthetic powers—not just to keep us alive to think, but to provide us with the \textit{phainomena} from which our thinking must start. Still, we can and should engage in theory for its own sake, and demote the theropic and aesthetic to the status of enabling means. Theory thus becomes ‘free’: 'Clearly, then, we seek it for \textit{dia} no other use, for just as we call a person free and not another's, so [we seek] this, as the only free science. For it alone is for itself.' [Met 982b24-28]

Aristotle makes theory autonomous in a strong sense: not just free from serving the practical project, but in charge of a project of its own, that of truth. 'The end of theoretical [science] is the truth, of

\textsuperscript{138} Compare NE's earlier statement of its purpose: 'for we are inquiring what excellence is not in order to know, but in order to become good' [1103b27-28].
practical the function.' [Met 993b20-21] This proper E of truth is to take on essential form, becoming like-in-form to what it thinks about.

Aristotle suggests at several key points that this theoretical project is not only independent of the practical, but higher than it; this is famously the point of the culminating chapters of NE, X.7-8. Practical noesis thinks about the human, but theory can think about the divine, and so become like it. This is why Aristotle marks off wisdom as a special synthesis of thought and knowledge: its direction at the divine, aims it at a higher E than the human good, which action is for. Met 1072b18-24: 'And thinking in itself is of the best in itself, and the most thinking is of the most best. ... For that able-to-receive the thought-of [noétou] and the substance, is thought, but it is actualized in having [the thought-of], and this rather than [the power] is the divine that thought seems to have, and theory is most pleasant and best.'

With evidence on both sides, it seems, we should notice a third option, that neither the practical nor the theoretical ‘side’ of noesis is basic, that each is ‘for its own sake’, as well as being sometimes for the other. This option is connected to the ‘inclusive’ or ‘comprehensive’ reading of Aristotle’s E for humans, in a well-known debate over NE.141

But before we can really settle the telic relations among these subpowers, we need to consider more broadly how the threptic, aesthetic, and noetic are all related to one another.

§5. Relations among the eidetic ends. We've seen how each of the three main types of organisms (plant, animal, human) is distinguished by a certain project—a distinctive way of aiming at distinctive goals. These goals are—to put it very briefly—persistence, pleasure, and ‘the good’. We've seen how the three

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139 Elsewhere he says that even practical intellect is for truth: 'of the intellect [dianoia] that is theoretical, not practical or productive, the 'well' and 'badly' are truth and falsity (for this is the function of everything intellective); but [the good] of the practical intellective is truth in agreement with right desire.' [NE 1139a27-31; also b12] MA 701a9-10 says that in reasoning and deducing 'the theorem is the end'.

140 Also near the end of EE, 1249b17-24 says that choices or possessions are best, insofar as they most produce the contemplation of god.

basic projects pursue these ‘internal goals’ both as motions and as activities. Now we turn to the ‘external relations’ among these basic strategies: do they stand in ‘means-to’ and ‘end-of’ relations to one another? Is any of these projects a way of carrying out one of the others—a particular strategy for accomplishing it? And is any of them an ultimate project which the others serve?

So we are looking for Aristotle’s ‘ultimate’ or ‘highest’ end. I will take these expressions to refer to an E that is both ‘final’ [teleion] (not explained by any other E) and also complete for all xs (such that no other E’ explains anything ‘independently’ of E). So not only is there no other E ‘above’ this ultimate E, but every other E is ‘below’ it in the sense of being explained by it. Hence this highest E is the ultimate explainer of everything that is explainable teleologically at all. Indeed, not only explanation is transmitted downward from the highest E, but goodness: all Es below it are explained by it, and they also receive their value from it. These crucial explanatory and normative warrants from the ultimate eidetic E are passed down first through the eidetic classification of life-strategies, and from these through the hyletic and kinetic teleologies as well: parts and motions will be ultimately explained and envalued in relation to the specific life-strategy they serve, and hence for (the sake of) the ultimate E it is finally a strategy for. So settling this highest E has sweeping consequences for how we hear Aristotle. We need to see what’s at the top, to understand how he can think it explains and envalues the ends below it.

We’ll see clear evidence that Aristotle accepts such a highest end. For example, Met 1075a18-19: ‘for everything has been ordered together [suntetaktai] towards one [end]’. This evidence includes especially the role he gives god in his system—our attention now to his top ends leads us obviously or inevitably to god. So we step out of the natural realm into the eternal. We will need to consider god’s role in his teleology, and in particular how those thrptic, aisthetic, and noetic projects are related to god. We must examine god’s ultimacy as both a (teleological) explainer, and as the good on which all other goods...

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142 Recall the definition of completeness from §1: ‘An end E is complete for x iff (E explains x and) there is no other end E’ that explains x, unless E’ either explains E, or is explained by E.’
Now in our model for this eidetic teleology, the question which project (threptic, aisthetic, or noetic) is ultimate amounts to the question which project typifies the highest kind or genus—is shared with the widest range of substances. I think there are two main possibilities here. I will gradually develop these as contrasting overall options for reading Aristotle’s teleology. His views can be collected into either of two rather different teleological systems.

First—and this may seem the most plausible—these kinds might be ordered with the noetic as a kind of aisthetic life, and the latter as a kind of threptic. So their telic order would be:

**Noesis → Aisthesis → Threpsis.**

If animals’ perception and humans’ thought are strategies serving the project of preserving and generating, then life’s ultimate E would be threpsis.

Or second—I’ll show this is the main alternative—the kinds might be ordered with the noetic as the highest genus, and the aisthetic and threptic as versions of it. In this case they would run:

**Threpsis → Aisthesis → Noesis.**

In this case life’s ultimate E would be noesis, by virtue somehow—and this is why the line is less obvious—of noesis being more broadly shared among substances.

There’s also a third option here—and it’s not the ultimacy of aisthesis. Perhaps none of the three projects is more basic than the others, and they stand as equally-penultimate Es under the genus ‘life’. In this case threpsis, aisthesis, and noesis would each be carried out for its own sake. So animals would have two basic projects, at survival and pleasure, and humans would have three.\(^{143}\) We’ll be reminded of this option as we weigh the two candidate ‘tops’ for the teleology. For we’ll see evidence that each is for the

\(^{143}\) This more inclusive conception of the human E is related to the reading of our noetic activity as for (the sake of) both theoretical and practical use—as discussed in §3c.
other, which will repose the possibility that neither is ultimate. Still, I think we will be able to discard this more democratic option—Aristotle must mean a hierarchy of Es, with either threpsis or noesis ultimate.

I'll examine these two readings of his teleology in sub-§s a and b below—though not so as to settle the issue between them. I'll carry them as live options into my final section assessing Aristotle’s teleology. Each reading will have its own strengths and weaknesses. These different ultimate Es offer different kinds of support for the great network of mediate ends he suspends from them.

Can either top support a teleology that we, with our science, could countenance? At first view, the threptic reading looks to give him a much better chance: if preserving-generating is the ultimate eidetic end, and both the hyletic and kinetic teleologies subserve this, then organisms' parts and motions would be 'for' survival and reproduction—as indeed they in a sense are, for neo-Darwinists today. But we'll need to examine this seeming affinity more closely, as well as Aristotle's apparently less promising prospects under the noetic reading of him.

a. Noesis → Aisthesis → Threpsis? The most obvious way of connecting Aristotle's three life-types is to give primacy to the threptic, and treat the others as versions of it. So the threptic project would be highest, divided into plant and animal strategies by the absence or presence of aisthesis, the animal strategy in turn divided into brute and human versions by the absence or presence of noesis. (So being a person is a way of being an animal, which is a way of being an organism.) Here perceiving and thinking are ways of engaging in the generic project of surviving/reproducing. Their essences are their ways of contributing to the threptic ends—i.e. their differentiae under the generic project. They are explained by that higher end, and they receive their value from their service of it. I think this is the way we most naturally conceive of Aristotle's division of organisms. And there is considerable support for this reading. Above all, it accords with ways he clearly does treat threpsis as the broadest life-activity; at issue is whether this breadth really shows the threptic project to be teleologically highest, i.e. both 'final' and ‘complete’.

First note the (strong) evidence that Aristotle ranks threpsis as the broadest genus. This power is
both sufficient and necessary for life; an organism begins upon acquiring, and dies upon losing it. Here is a series of passages from De Anima: 'we call life self-nourishment \( \text{tên di' hautou trophên} \) and growth and decay' [412a13]; 'for the threptic soul both belongs to the others, and is the first and most common power of soul, by which life belongs to all' [415a23]; 'since it is just to call all things after the end, and the end is to generate something like itself, the first soul would be that generating of another like itself' [416b24]; '[e]very mobile \( \text{poreutikon} \) body would, if it didn't have sensation, perish and not reach its end, which is the function \( \text{ergon} \) of nature; for how could it feed \( \text{threpsetai} \)?' [434a33-b2].

It is less clear, however, whether Aristotle infers from the breadth of threptic activity, that its end of surviving-and-generating is highest, with the aesthetic and noetic projects also for (the sake of) it. One might suspect that my reading of the species-genus relation as teleological has here led us wrong; the most generic project might not be the highest E. There's another way of presenting the universality of threpsis: instead of being what all life-processes are ultimately for, it might be a mere precondition or 'platform' for the pursuit of further ends—ends not themselves just means to surviving and generating. What evidence is there that Aristotle thinks that not just plants but animals and persons are ultimately for these threptic ends? Not surprisingly, we find that the threptic project can make a stronger claim to explain aesthetic animals than noetic persons.

Begin with the evidence for Aisthesis \( \rightarrow \) Threpsis. Many passages suggest that animals have survival and/or reproduction as their ultimate goal. Aristotle often says that their activities are all parts of

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144 See also 434a22-26.

145 This reading accommodates passages describing threpsis as ‘necessary’, e.g. PA 655b30-38: 'in all animals—those that are final—there are two parts that are most necessary, that by which food is received, and that by which residue is expelled. For neither being nor growth is possible without food.'

146 Nussbaum 1978, 77 says the capacity for self-maintenance is the soul that 'in a way encompasses and subsumes all the others. ... All the more specialized capacities are to be explained functionally, as tending to promote life.' She says that animal intentionality subserves the threptic [86], but allows an exception for intellect [82n27]. Furth 1988, 159: 'all the powers of the psyche—aesthetic, kinetic, et cetera—are mobilized in achieving the many particular instrumental tele that are 'for the sake of' the main \( \text{telos} \) of self-maintenance and self-preservation'. Also Freeland 1994,
this project. HA 589a4-6: 'one part of living is the activities about \(peri\) making offspring, and the other those about feeding; for all their efforts and life are about these two.' HA 596b20-22: 'The activities of animals are all about \(peri\) breeding and begetting children, and about the supply of food'.

Many other passages suggest that the aisthetic powers are 'for' pursuing these threptic ends. Perception is usually presented as for procuring food. So the basic and universal sense is touch, because this perceives the edible qualities of things; its special sensibles are hot/cold and dry/moist, which are the properties that nourish [DA 414b6]. The other, distal senses 'are for preservation, so that, by pre-perceiving, [moving animals] can pursue food and avoid bad and destructive things' [Sens 436b20]. It seems that imagination, desire, and movement all likewise subserve animals' self-nourishment.

However, it's harder to fit noesis into this model—to read Aristotle as holding either Noesis \(\rightarrow\) Aisthesis or Noesis \(\rightarrow\) Threpsis. Of course, in many individual cases the noetic power does serve (aesthetic) desire, and thereby also (threptic) self-sustaining. The noetic subpowers are often or even usually martialed by their practical wing, to guide behavior. And often this practical behavior is directed at threptic ends. It is notable that his favorite example of rational making is one in which rationality serves a threptic aim. This is his case of producing health—the same bodily health aimed at by threptic processes. Aristotle has in mind a rational project pursued not just by doctors, but by people generally, as they adjust their own habits for their health. Nevertheless, as we began to see above, Aristotle also stresses that noesis has different ends than these, and that the threptic or practical uses are not thinking’s best or most proper

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47. And I take Gotthelf 1988 as a sustained argument for this reading.

147 Also GA 717a23. GA 741a1 identifies threptic soul as the 'nature' of plants and animals.

148 Also Sens 436b16; DA 434a32-b2, 434b11-19.

149 NE 1118a18-23. Nussbaum 1978, 86: 'Animals do not seem to have desires and intentions that are not in some clear way related to self-maintaining.'

150 E.g. Phy 194b33-195a1 ........ Also Phy 192b23-7.
We'll shortly, in §b, look more closely at evidence for the ultimacy of noesis. But let's anticipate one main argument, to see how the threptic reading might respond to it. One main ground for counting noesis rather than threpsis as Aristotle's ultimate E, is that it seems to fit better with his theology. For surely the top eidetic end must be somehow linked to god (or 'the divine'), which Aristotle elsewhere identifies as the highest end-cause of all. The top eidetic E must be the project that is not only pursued by all organisms, but also emblematically accomplished by god. In this way god, as the highest good, can share with that project the title of the ultimate E from which all teleology descends and depends. All living things should be, as it were, 'modes of god', in being essentially specific ways of pursuing (and falling short of) the divine activity. But since god's activity is thinking, it seems that this link must run through noesis rather than threpsis: living things must be 'modes of thinking'.

However, the threptic reading is not helpless against this objection; it does have a claim to accommodate god's ultimacy; it has a strategy to claim that point for its own. One of god's distinguishing features—indeed the one Aristotle refers to most often—is its eternity [αἰδιός], and this might be thought the point to the threptic project: surviving forever. So god's ultimacy would lie in its being the fullest achievement of threpsis, which would justify the latter's claim to be life's ultimate project. DA 415a29-b2 says that a living thing reproduces 'so that [hina] it may partake in the eternal and divine so far as possible; for all things strive [oregetai] at that, and for that they do whatever they do [prattei] by nature.'

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151 Kosman 1988: god is introduced in Met XII 'not primarily as an explanation of the existence of the world, but of its being' [171]; god explains as the 'formal principle' of substance-being [178].

152 Met XII.7, Cael II.12, DA III.5.

153 Met 1072b30: ‘life and duration continuous and eternal [αἰών συνεχῆς καὶ αἰδίος] belong to god; for this is god’.

154 GC 336b25-34 says that generation and corruption will be always continuous [sunechē] because this is the closest (next best) to (eternal) being. So argues Gotthelf 1988, 129: 'in aiming at divinity, animals are not aiming at something other than self-preservation; divinity here just is eternal self-preservation, eternal self-continuance'.
The threptic reading can also claim to fit with how Aristotle uses god to explain. The divine E’s first xs are the celestial spheres, which imitate especially the unendingness of god's activity. And the spheres’ eternal circular motion is in turn isomorphic with the startless and stopless reproductive cycles, by which species are eternal too. The threptic project sustains these cycles, and so accomplishes that divine unendingness. Aisthesis, besides facilitating these reproductive cycles for animals, can be seen to involve a cyclicality of its own, in the alternation of desire and satisfaction which belongs to the logic of pleasure. Similarly, thinking could be simply a means for self-sustaining, not an independent project such sustaining is for. And in fact, thinking owes its high status partly to its being the 'most continuous' \([\text{sunechestatê}]\) activity [NE 1177a21-22].\textsuperscript{155} Perhaps god thinks, only because this is the best means to sustaining itself.

Although a case for threptic ultimacy can be made on these lines, other evidence can be marshalled against it, and for an opposite ordering of the noetic powers. I turn now to this opposite case, before assessing both positions in §6.

b. Threpsis \(\rightarrow\) Aisthesis \(\rightarrow\) Noesis? There's a second candidate for the 'top' of Aristotle's eidetic teleology, a candidate whose strengths emerge to a closer view. We were hasty in assuming that threpsis must be the most generic project; this rested on our expectation that the generic project must be the most generally achieved. But there's a way that what seemed the narrowest project—noesis or thinking—might be the broadest after all. Perhaps threpsis and aisthesis are really attempts at it, that by themselves fall short of what they're for. Then plants and animals would be 'failed persons', their projects essentially defined as towards noetic ends, but carrying only partway there.\textsuperscript{156} Life would be for (the sake of) thinking. Here, by contrast with the prior reading, the generic project is one that not all species (indeed none but one) can

\textsuperscript{155} Also in favor of this are Aristotle’s suggestions that it’s god’s immortality that we (should) aspire to; e.g. NE 1177b33.

\textsuperscript{156} Compare this with Aristotle's suggestion (discussed in §3a) that organisms pursue generation as a second-best to (eternal) individual survival.
execute or accomplish.

This would make the eidetic hierarchy work differently than we expected. Rather than treating simpler projects as explaining more complex, it treats the latter as explanatorily basic. So we don’t explain animals as having the threptic aims of plants, and more besides; we explain plants as having just threptic Es because they are incapable of the fuller aesthetic activity. When we group together plants and animals, it’s the latter that show the essence of the broader kind. And similarly when we group animals and humans. This means that Aristotle’s common definition of the human as ‘animal with logos’ is misleading. In his own explanatory practice, he begins with humans, and explains brutes as falling short of them.\(^{157}\)

The claim of threpsis to subsume life’s other projects is least convincing in the case of noesis. Despite the indications above, I think Aristotle dominantly holds that \textbf{not-[Noesis \rightarrow Threpsis]}, i.e. that noesis is not, in the end or overall, for threptic service. The cognitive power may of course be used, in cases, for threptic ends, but this is not what the power itself is ultimately for. Indeed, it may be that noesis properly takes on threptic ends only insofar as the latter are means or conditions for its own activity: in persons, \(N\rightarrow T\) only insofar as \(T\rightarrow N\). So \([N\rightarrow T]\rightarrow N\). Thinking contrives for survival only as a means to thinking’s own goals—to more and better thinking. In \(\S 3\) we began to see the autonomy of theoretical from practical noesis; now we turn to the autonomy of noesis itself, from the threptic and aesthetic projects.

a) Even practical noesis doesn't ultimately serve either desire or survival. Unlike desire, it's for the good, not the apparent good (pleasure). And this practical good \([prakton agathon]\) can conflict with our interests in surviving and reproducing. So, saliently, the virtue of courage requires accepting pain and even death, for the sake of being noble or fine [NE 1117b7-15]. The \textit{phronimos} will indeed pursue pleasures, but

\(^{157}\)PA 656a7-13 launches the work’s treatment of individual species by arguing that ‘we must speak of [the human] first’, since this kind shares most in the divine, is most known to us already, and because ‘in [the human] alone the natural parts hold [i.e. are arranged and related] according to nature’. Also IA 706a17-25.
only the pleasures to be had in good activities; he will want to live longer, but only as living well.\textsuperscript{158}

b) And theoretical noesis is still less dependent on the other life-projects. In a famous discussion in NE X.7-8 Aristotle argues that our highest good or happiness \textit{[eudaimonia]} is the activity of \textit{nous}, which he here calls \textit{theòria}. (This is usually rendered ‘contemplation’, but I prefer the cognate, ‘theory’—which again we must hear in the sense Aristotle supplies. Since it refers to an activity, it is equivalent to theorizing \textit{[theorein].}) NE 1177b1-3: ‘It alone seems to be loved for \textit{[di’]} itself, for nothing comes to be from it beyond the theorizing, but from practical [activities] we gain more or less beyond the activity.’\textsuperscript{159}

Initially, however, the independence of our theorizing from the threptic and noetic projects doesn’t at all suggest that the latter are dependent on it—that they are ‘for’ it. Aristotle clearly holds that persons can and should turn their aesthetic and even threptic processes to serve noesis. But this doesn’t show that he thinks those projects are ‘for’ noesis generally, including among animals and plants quite incapable of noesis.\textsuperscript{160} Indeed, their incapacity itself looks like a strong Aristotelian argument that plants and animals are not for (the sake of) noesis. Since ‘nature does nothing in vain’\textsuperscript{161}, how could those organisms’ parts and processes be for something they can never achieve? Nevertheless we find Aristotle assigning just such surpassing Es.

Let's reconsider animals' aisthesis. In §a we saw strong evidence that Aisthesis $\rightarrow$ Threpsis. But we can also find evidence that aisthesis is for something quite independent of threpsis—neither threpsis nor

\begin{itemize}
\item \textsuperscript{158} NE 1153a22-3: ‘The [pleasures] from theorizing and learning will make us theorize and learn all the more.’ See Annas 1980 on Aristotle’s insistence that some pleasures are good—despite his tendency to treat pleasure and the good as mutually exclusive goals.
\item \textsuperscript{159} Nagel 1972, : ‘And although reason helps us to get enough to eat and move around, it is not subservient to those lower functions. Occasionally it may have to serve as the janitor or pimp of the passions, but that is not basically what it is for.’
\item \textsuperscript{160} We must bear in mind that this teleological point goes beyond the valuative one: that noesis is ‘worth more’ or ‘better’ than threpsis or aisthesis doesn’t entail that the latter are ‘for (the sake of)’ noesis—i.e. that noesis explains them as their E.
\item \textsuperscript{161} On this phrase, and for examples of Aristotle’s many uses of it, see Lennox 2001, 205-223.
\end{itemize}
a means to it. We find Aristotle explaining ‘higher’ levels of aesthetic functioning by an E he contrasts with the threptic aim of survival. So even if threpsis is an end of aisthesis, it is not a complete end. Nor, in these cases, is this further E just the aesthetic aim, pleasure. More acute perceptual powers, for example, are for (the sake of) something different from survival and pleasure both.

Aristotle often refers to this further E as 'being-well' [to eu]. It's by their differing successes towards this E, that Aristotle ranks species. Here ‘the good’ is something more than the organism’s threptic goal of preserving its life-kind. All of the animal types have continued their specific lives forever, yet some have more of this good than others; nor are these those that survive in greater numbers. PA 656a4-7: 'Those having, besides life, perception, have a more multifarious form [polumorphoteran idean], and some of these more so than others, and the most multifarious [polukhousteran] are those whose nature shares not just in life but living well.' So, for example, animals that perceive only by touch are 'imperfect' [DA 433b32]; what the distance-senses add is not more or better survivability, but improved quality of what survives, its being-well.

What is this being-well that aisthesis is also for? Unsurprisingly, I think it's a property that noesis has preeminently, that indeed distinguishes it, and theory in particular. In being ‘for’ this property,

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162 E.g GA 717a15ff. Here I disagree with Gotthelf [1988, 120]: ‘the goodness of a state or process of an organism lies in its contribution to the life—to the preservation and realization of the being—of that organism’; the life’s goodness derives ‘from the life’s being an (approximation to full) actuality’. I agree that (achieving a maximum of) energeia is the final E, but think this means more than simply acting out whatever the organism’s kind of life happens to be. Aristotle wants to explain these life-kinds by citing an E of activity they realize to differing degrees, and noesis most fully.

163 Gotthelf [1988, 128] suggests that Aristotle’s rankings of species may not be by any external criterion, but by mere comparison of capacities: ‘one life-form is “higher” than another if it has all the capacities the other has, and then some; the “then some” may be another capacity, or it may be a more powerful version of the former capacity’. But I don’t think this does justice to the way noesis completes or perfects the lesser powers.

164 Also explaining the senses as for to eu: DA 434b24, 435b20; Sens 437a1. See too DA 420b20, PA659b33 explaining the power of speech as for to eu.

165 Met 1072b23: ‘so [activity] rather than [capacity] seems to be the divine which nous has’.
Aisthesis is explained as being ‘towards’ noesis: it is understood as an incomplete or imperfect version of it.\footnote{DA 429b16-17 compares perception’s relation to the power that grasps essences, with the relation of a bent line to the line straightened out.} So Aisthesis $\rightarrow$ Noesis. Aristotle implies this relation when he treats animals’ perception as a step towards the noetic powers—a more primitive discriminating that reaches a completion in human cognition [e.g. APo 99b34-100a3, Sens 437a1-4]. He also implies A$\rightarrow$N when he explains humans as approaches to divinity—insofar as they more fully accomplish the noetic project.\footnote{Compare Kosman 1988, 184-5 on thinking as ‘animate awareness’ ‘increasingly realized in the scala naturae’. Also Kosman 1992, 356: ‘$\text{Theòria}$ is not theory, it is simply the principle of awareness ... of which scientific activity and philosophical speculation are to be sure particularly subtle forms, but of which the ruder and more incorporate activities of perception and nutrition are equally images...’} 

But how can we reconcile this with the evidence above in favor of A$\rightarrow$T? Is it simply that aisthesis is pulled in two directions, towards independent Es—neither of them therefore complete? We might hear this in DA 434b5-7: ‘Why will [a moving animal] not have [sensation]? It would have to be better either for the soul or the body; but in fact it is neither, for through [the absence of sensation] the one will not think better, nor the other be better.’\footnote{Compare NE I.13’s discounting of the threptic as irrelevant to ethics, because operating beneath the level of character; this suggests a different kind of independence for it.} Are soul and body here associated with distinct, independent aims? But again I think Aristotle insists on a telic sequence and priority here. Just as N$\rightarrow$T only within the fuller telic scheme [N$\rightarrow$T] $\rightarrow$ N, so here: [A$\rightarrow$T] $\rightarrow$ N. Aisthesis serves threptic ends only because the latter are themselves approaches to the ultimate, noetic E.

This brings us to Aristotle’s ground for holding Threpsis $\rightarrow$ Noesis. To see this as the true telic relation between these powers, we need to return to his theology. The threptic line (in §a) can’t do justice to god's role as ultimate E. Its attempt to capture that role, mistakes what makes god—and god’s activity of noein or theorein—ultimate, and how those reproductive cycles resemble it.\footnote{Here again Gotthelf 1988 gives the best case for the opposition; see n. 144 above.} God's divinity and eternity...
do not principally consist in its existing forever—that would be something that species, by their eternally cycling generations, achieve. God's divinity lies in something else, which this eternal cycling is only a step or approximation towards.\footnote{Kosman pairs the two ways we can imitate divinity in the memorable ending to his 1984: ‘But the best in our life may be to approximate that being in the ways Aristotle allows, which may explain why we often feel most divine when procreating and thinking.’}

What is it about thinking that makes it the ultimate end, and divine? A first answer is, its preeminent activity [energeia].\footnote{DA 430a18 says that active (poiētikê) nous is ‘inseparable and impassive and unmixed, being in substance activity [têi ousia on energeia]’. This is echoed in Met 1071b20’s account of god as a source ‘whose substance is activity [hês hé ousia energeia]’.} Thinking achieves a level or degree of activity that other life-processes can't have. We are not reverting here to the claim about activity rejected near the start of §2, that the organism’s distinctive, species-activity is its ultimate end. Organisms are for activating their species-capacities—but this is not (more ultimately) for the sake of those specific capacities, rather for the degree of activity they permit. The E of activity transcends the species-capacity, and explains it, for Aristotle.\footnote{Here I disagree with Cooper [1987, 250 n 8]: ‘He consistently takes the existing species as given; they are the good things by reference to which to explain those features of reality that he thinks need to be explained teleologically.’} A kind of organism acts specifically so, because such is the most it can have of activity, per se—the most its matter, and its kinetic sources, enable it to have. This higher E supplies an interspecies standard: Aristotle is constantly evaluating and ranking species, ultimately by the degree of activity their capacities allow.\footnote{Oppositely to Gotthelf 1988, 130, making energeia simply being what one is, and divinity simply eternal activity.} Noetic life—lived by gods and humans—is higher because more actual than the aesthetical and threptical lives of brutes and plants.

We get a clearer sense what this activity/energeia is, by looking at what Aristotle most prizes about thinking or theorein. This is, above all, its self-sufficiency—its telic self-sufficiency, its being done ‘for its own sake’. As I will try to show, it is this special way of being towards ends, that is itself the E that explains
all the other, lesser ways of being towards ends, according to Aristotle. (Whereas the point that theory is continuous, cited above in favor of the ultimacy of the threptic aim, is really something secondary, as is its pleasantness, mentioned next [NE 1177a21-7].)

Aristotle marks thinking’s telic self-sufficiency by stressing that it is not a motion. Motions are essentially incomplete; the E that explains them is extrinsic to them. The threptic and aesthetic projects still have this character: they aim towards outcomes at which their effort would cease. Motion can partly escape this incompleteness by being cyclical—like the cycles of generations. Such cyclical motion imitates that of the heavens, which is itself an approximation towards the pure actuality of thinking. 174 This is expressed in a famous passage from On Generation and Corruption [336b27-34]:

For we say that nature in everything always reaches out [oregesthai] at the better, and being is better than not being …, but since this is incapable of prevailing in everything because they stand far from the source, god fulfilled the whole in the remaining way, [by] making generation constant [endelechê]—for thus being would be most connected, since the closest to ousia is eternal becoming [to ginesthai aer] and generation.

This makes clear how Aristotle wants activity (here being and ousia) as his ultimate explainer. 175

This brings out one more way that teleology is ultimate for Aristotle: activity is itself a particular way of being towards ends. 176 It is the way of most fully having Es, i.e. it is the way of being most fully explainable by Es. Thinking happens because it is good. The thinker thinks because he/she knows it is good, so that its goodness explains the process. Aristotle considers this the paradigm case of teleology; all

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174 See Kosman 1994a, 147 on how circular motion mediates between motion and the activity of nous. He argues [148-9] that energeia is the genus to which motion itself belongs.

175 Kosman 1984, 148: ‘when in a more formal ontological moment, I explain that Abromowitz is busy at work being what she is, I specify her ousia in terms of to ti én einai, the general nature of which is energeia pure and simple, and so in some sense I link Abromowitz as substance to God, and as paronymously akinêton and energeia.’

176 The teleological force of activity is suggested in the words Aristotle uses, energeia (in the function or work) and entelecheia (holding in the end).
other cases are lesser, derivative versions of it. In these other cases the outcome doesn’t explain as good (but as the apparent good, or as preserving). Or, in those other cases, insofar as the good does explain it does so incompletely, and in conjunction with the limits matter and kinetic source place on realizing it.

So in noesis, being-for-E occurs in its ultimate form: noesis is most fully and clearly explainable by its end. And this is most of all the case with divine noesis—contrary to the notion that in god both directedness and ends disappear. So the progression from threpsis to aisthesis to noesis is not only an advance towards an E, but an advance towards a fuller or more perfect way of having an E. The ultimate E, is to have Es more perfectly. Thinking is the most perfect or complete activity, because it is fully and proximately explained by the good as E.

Now it might seem that in introducing god to explain organisms, Aristotle can’t be using the eidetic explanatory strategy I’ve analyzed. How could the highest E be given in the highest kind or genus, if in fact it’s given in god? But I think this is just the way adding god works, for Aristotle: it shows that the kind ‘life’ extends more widely than the organisms around us. When we broaden this kind to include god, we discover that the threptic project can’t be life’s defining aim (since god lacks it). God shows first the point to our own noetic activity—different than the practical or threptic purposes we might have thought it served. And it further shows how the threptic and aisthetic projects of plants and animals should be reinterpreted as partial successes at this more encompassing project.

To be sure, this involves attributing to plants and animals and even humans an ultimate E impossible for them to achieve. But Aristotle often does this. He speaks of the ‘distance’ of different

177 Aristotle describes this telic completeness in Cael 292b2-7, contrasting it with human praxis: ‘the actions of the human are most numerous [among organisms]; for he is able to strike at many goods, so that he does [prattei] many things, and for further things [allón henêka]. But what has the best things does not need action [praxeôs]; for it is itself the for which [to hou henêka], but action is always in two [factors], when [there is] both a for which and something for it.’

178 I think Aristotle also calls this E autarkeia/self-sufficiency; Pol 1252b34-1263a1: ‘the for which and the end is best, and self-sufficiency is both end and best’.
organisms from the divine E in Cael 292b10-12: ‘One thing has and participates in the best, another reaches it straightaway by a few [steps], another by many, and another does not undertake it, but suffices to come near the ultimate.’ He continues with an analogy of health, describing how some have this already, others pursue it by shorter or longer chains of means, such as running and thinning, whereas others can’t become healthy, but pursue only those means: ‘another is unable to come to health, but only to running or thinning, and one of these is the end for him. To hit that end is best for all, but if not it is always better to be nearer the best.’ [292b17-9] Aristotle’s general reason why organisms are cut off from the best, is that it is their matter or particularly their ‘earth’ that inhibits them.\footnote{179}

In sum, although a case can be made that threptic Es are ultimate in the eidetic teleology, I think there’s stronger evidence that Aristotle makes noesis ultimate. But let’s keep both options in view, as we turn to consider both the sense, and the merits, of Aristotle’s teleology.

\textbf{§6. Assessing Aristotle's teleologies.} It's only at the 'top' of Aristotle's teleology, in its very highest eidetic end, that we can face key questions about its overall character. It's here that his telic explanations begin; so it's here we can ask, what right he has to this beginning. He hangs all the rest of his explanations from this top, and we must examine whether it really can support them. We've seen two candidates for this ultimate E. In what's left, I'll assess the positions these two readings attribute to Aristotle. Each has its own sets of strengths and weaknesses. Does either give him a plausible eidetic teleology—i.e. account of our basic ends? Does either give him an eidetic teleology that plausibly supports or explains his hyletic and kinetic teleologies?

It’s not just that the top E—the first telic explainer—purports to ‘support’ the rest of Aristotle’s

\footnote{179]{Note Aristotle's exhortation at NE 1177b31-34: 'But we need not follow those advising us to mind human things, being human, nor mortal things, being mortal, but [ought] as far as possible to immortalize [ourselves] and make everything towards living according to the strongest thing in us.'}

\footnote{180}{DA 435b1 says that plants have no perception because they consist only of earth.}
explanations by ends. It also helps determine the sense in which those other Es are supposed to explain. I’ve mapped his three explanatory networks, showing “what explains what”, but without asking how these different kinds of Es are supposed to explain their xs, nor indeed whether they (really) do so. Now we must face these issues. How does Aristotle think that wholes explain parts, goals explain processes, and genera explain forms? And can the former really be, as he calls them, causes or aitiai of the latter? Such 'explanation' collides with our conviction that the true causes of all these xs must be the efficient causes our science will arrive at. Familiarly, Aristotle’s teleology is in disrepute—and has been for most scientific thinkers for hundreds of years. It is taken as the main spoiler of his scientific thinking, and the main way his influence has been deleterious.

I’ll raise and consider three main problems that arise against Aristotle’s teleology. One is a problem with the explanatory logic he attributes to ends:

a) How can Aristotle’s ends explain, when they aren’t antecedent states or events—aren’t efficient causes, as we think the genuine explainers must be?

A second problem is with the way he takes his ends to be goods:

b) How can Aristotle justify ends’ value, and how can their value function in their explaining?

And the third problem is whether his teleology is consistent or consonant with the evolutionary and genetic insights about life of our own biology:

c) How could his teleology be true—be an accurate or revealing account of organisms—if it stands in ignorance of evolutionary facts, so crucial for explaining them?

I think these are our principal doubts against Aristotle’s teleology, and so the most suitable criteria for judging it. Can his top eidetic end support a teleology with answers to these challenges? Let me quickly amplify the first two problems, with a few familiar points

a) How can Es be causes, when they seem to occur—if indeed they occur at all—later than the xs they’re supposed to explain? Teleology seems to posit a backwards causation. Since we won't allow that
the future can cause a present x, it seems we must find some way in which the end can have a causal presence before the explanandum. We need some kind of 'preexistence' for the end, before the x it explains. The E may indeed occur in the future, but it must somehow occur in the past as well.

We’ve seen that this looks feasible within a limited domain: for human—and perhaps some animal—intentions, where there’s a 'representation' of the future goal that can serve as (part of) the efficient cause of behavior towards it. Here it’s not the goal as future state that explains, but the goal as represented in that past intention. However, there are no such intentions to explain most organic processes—those in plants, those running beneath the level of intentions in humans and animals—much less to explain organic parts: none of these is intended or represented in advance, and caused by such intentions.

b) How can Es be values, and how can they explain as values? Teleology seems to step out of science to the extent that it so valorizes these ends. For it seems that no amount of genuinely scientific scrutiny could ever reveal values in things. And it’s even more puzzling how explanation could depend on identifying such values. So we need some way to make ends’ values ‘accessible’ to science, and some way to find room for them within (some of) its explanations.

Here again an intentional teleology has the easiest answer: the goodness of an E is just an intentional content, a way the E is represented by the ‘intender’. The occurrence of such representations are objective facts—albeit facts about subjective contents. Science can study these contents without venturing any value-claims itself: it merely studies how the valuers do value. But once again this answer applies to only a very limited range of organisms’ ends; the Es of organic parts and processes are generally not intentionally pursued, and so not (in that way) good.

Aristotle faces these first two problems because he rejects the ‘global intentional’ strategy of Plato. That is, he detaches teleology from Plato’s basis for it, a creating god. Plato attributes Es to the world
because he thinks a divine architect has made it for them.181 God establishes ends—puts them into things—by thinking how it (god) wants the world to be, and making the world accordingly. Plato’s posit is incredible to us, but it does give him answers to those first two objections. Granting that posit, the Es of organisms, and of the *kosmos* in general, are instantiated in an efficient cause—god’s will or intention, which ‘looks ahead’ to this E. This will—and so in a way the E—causes, in a sense near enough to our own, the Es’ explaineds, the things god makes (so answering challenge a).182 Moreover this account of the Es shows how they could appropriately involve values or goods: if the divine mind aims at these outcomes, they are surely ‘good for/to it’, and even plausibly therefore good per se (so answering challenge b).

Aristotle famously breaks with this account. He still connects his teleology with god—in ways we’ll examine—but he abandons Plato’s view that god makes the *kosmos*. Aristotle’s *kosmos* is eternal, and his god pays no heed to it. So organisms don’t have Es by god’s having designed Es into them. In particular, god doesn’t ‘make’ any of the three teleological networks we’ve distinguished: the system of organisms’ (hyletic) parts, or the sequence of their (kinetic) generation, or the hierarchy of their (eidetic) kinds. God doesn’t make parts for wholes, nor eggs for adults, nor specific for generic projects—but in that case how do the latter explain the former, in each of these three networks?

In refusing to anchor his teleology in a creator, Aristotle seems to lose any answers to objections a and b.183 Most of his Es seem to float free from any material or efficient support. It’s only in the cases of human and perhaps animal action, that he attributes the kinds of intentions we think are needed to establish ends (and that are present throughout on Plato’s account). As we saw in §4c, he elucidates how the end has a causal role in these cases by being thought in advance; but he seems to supply no substitute in non-

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181 *Timaeus* describes how the *demiourgos* made the world after an eternal model, to be as good as possible [30a].

182 The end has, as it were, a causal presence in advance of those explananda, in god’s preview of it.

183 Furley [1996, 65]: ‘What we have to do to make sense of Aristotle’s teleology is to find a substitute for Mind as the agent in teleological processes and structures.’
intentional cases. The hyletic and eidetic systems of ends, and all the kinetic processes not steered by mind or imagination (including those in the organs, and those in generation), have Es with no such support. Nothing ‘looks ahead’ at these Es, and gives them a causal role in advance of what they purport to explain. Animals’ hyletic structure, for example—the way tissues serve organs and organs serve organisms—is not due to any desire that makes parts for wholes; so how can the latter explain the former? Moreover there’s no mind or desire that these Es are ‘good for/to’, to justify attributing value to them. When Aristotle gives up creationism, it seems he should give up most teleology too.

Our own demand for an efficient causal basis for teleology might seem directly at odds with Aristotle’s outlook. He insists, after all, that ends explain in addition to matter and movers—that an E is a separate cause or explainer. Indeed, he insists that ends explain in some way ‘more’ or ‘better’ than matter and movers do—as was reflected in his claims (from §3) that (End b/c Matter) b/c E and (E b/c Source of motion) b/c E. So explanations begin with ends, and matter and movers explain only in subordination to ends. Aristotle asserts, in other words, the independence and priority of Es, as explainers. Given these claims, the requirement that Es be ‘grounded’ in efficient causes may seem to beg the question against him. It may seem we could only read him so, against his own strong insistence. So the case looks hopeless.

Nevertheless, there may be ways of understanding this independence and priority of teleology that would still allow (Aristotle to expect) the kind of efficient explanations our science demands. It may be, for example, that Aristotle thinks these Es explain by being not efficient (or kinetic) causes straightforwardly or simpliciter, but some kind of special features or structures of efficient causes—and that he distinguishes them from kinetic explainers only because they pick out this special aspect or structure. We can get a sense of the options here by looking quickly at one group of recent accounts of Aristotle’s teleology; I’ll call these ‘dunamis-analyses’.

The general strategy in these analyses is to treat the E as explaining by its being somehow ‘present’ in the dunamis/capacity, and then to treat this dunamis as comparable to a causal disposition or tendency,
such as we (our science) would allow. So e.g. there is a capacity in the tissue, a tendency to bring about a certain outcome, viz. its functional service in the organ. And there is a comparable capacity in the seed, to grow into the adult organism. The telos/end is not the outcome per se, but the outcome as a feature of the capacity—as the direction (heading) of its causal tendencies. So it’s not the E as future achievement that explains, but the E presently at work in the dunamis.

The most fully detailed such reading, and the most influential, has been Gotthelf’s [esp. 1987b and 1988]. He reads Aristotle’s teleology as crucially positing an ‘irreducible potential for form’. This potential is irreducible in that it can’t be analyzed into simpler potentials of the matter (e.g. of the elements of which the tissue consists). And this potential can only be identified by referring to the form it tends to effect. Aristotle’s explanation runs through these potentials, and because they’re irreducible, their identifying forms play a real (efficient) causal role. Gotthelf thinks this irreducibility captures Aristotle’s insistence on the independence and priority of Es. And as we see, it makes those Es explain by their role in a special kind of efficient cause, so that it renders Aristotle’s teleology less ‘disembodied’ than it may have seemed. Its Es don’t explain magically, from the future.

Other interpreters have pursued different versions of this strategy. Some have nudged Aristotle further our way by likening this potential to the ‘program’ in DNA. So Bradie and Miller [1984, 143]: ‘The type of movement required on Aristotle’s account for a potential for form is the type of movement exemplified by the DNA molecule. The genetic “program” contained in the molecule’s structure directs and limits the organism’s growth in the manner set forth in Aristotle’s biological writings.’

They retract the ‘irreducibility’ Gotthelf claims: Aristotle rejects reduction of these potentials to the four elements, but leaves open ‘a reduction to some other material principles’ [142]. So ‘the core of Aristotle’s teleology …

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184 So Gotthelf 1987b, 232: ‘If . . . the production of a complex organic outcome is not the sum of actualizations of element-potentials, then the nature or potential being actualized must be . . . a potential for form. But that makes the explanation teleological, because it puts into the explanans an irreducible reference to an outcome for which the explanandum is antecedently necessary.’ Also 1997, 75.
has been vindicated by modern biology’ [143]. This aligns Aristotle with one main part of our biology, the genetic explanation of phenotypes, though not with the other main part, the Darwinian explanation of those genes.

In either of these versions, this strategy faces a difficult challenge: to show how these Es can be lodged in potentials or capacities in the right kind of way, to make them explanatory. The fact that potentials are identified by the outcomes they tend to effect, isn’t enough to make those outcomes explain the potentials, or what they do. Even our own genetic explanations of phenotypes—the account of DNA as a ‘recipe’ for the organism—isn’t enough to make the phenotype explain the DNA or what it does, any more than any other causal tendency is explained by its tended-effect. Because Aristotle lacks the Darwinian explanation of these potentials or programs themselves, it seems he would not be entitled to say that their outcomes explain the potentials (or what they do). So this strategy on behalf of his teleology, though reconciling it with efficient causation, may take away its claim to explain by ends.

The strategy faces a further challenge, issuing from question b above. Aristotle treats his Es not just as explainers, but as good. The effort to naturalize these Es by lodging them in potentials, must on the one hand ‘do justice’ to the value he attributes to Es, yet on the other permit this value to be naturalized as well. Gotthelf’s tactic is to argue [1988] that Aristotle’s ends are not to be analyzed in terms of goodness, but vice versa: goodness is essentially the realization of ends—ends already present in dunameis. And since dunameis happen to be aimed at organisms’ continued life, this is what Aristotle counts as good. So goodness consists in being the end of one of the irreducible potentials. Once again, however, this may give

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185 See Scaltsas 1988 for related criticisms of Gotthelf.

186 This is connected with another problem for the strategy: it seems to shift explanatory weight to powers, whereas Aristotle wants activities to explain. (And, it seems, he wants them to explain not as just the tended-effects of powers.)

187 Gotthelf 1988, 117: ‘for Aristotle the goodness of something, at least in biological contexts, is regularly its capacity to contribute to the continued life (zê̂n) of the organism which has or performs or undergoes that something’.
Aristotle importantly less than he wants. For his claim, it may seem, is that ends explain as good, at least in the primary cases.

We must note a complication here. Aristotle treats Es as being sometimes goods, and sometimes apparent goods. To the disapproval of some readers, he seems to pass freely between these.\footnote{Woodfield 1976, 211: ‘When Aristotle said that it didn’t matter whether a teleological end was actually good or apparently good, he encouraged the conflation of two quite different conceptions of what an end is. If the end is actually good for a being, it is what I call a natural or biological end. If the end is an action that a being regards as good to do (i.e. an action which appears good to that being), then it is a goal.’} This poses a threat to the effort to naturalize goodness as simply another way of speaking about potentials’ ends. For some such potentials, it seems, aim at Es that are only apparent goods. Aristotle has some other criterion for goodness, it seems, than just being the aim of an irreducible potential.

I’ll try to give a reading of Aristotle that answers these challenges. In fact, I’ll offer two different readings—what I think are the two best answers Aristotle can give to these problems we find with his teleology. These are elaborations of the theptic and noetic readings introduced above. While preserving the difference and distinctness of Aristotle’s view, they still bring it ‘closest’—into greatest consistency with—our own explanations of organisms.

In assessing Aristotle’s answers to these challenges, and his degree of closeness to our own biological explanations, it will help to have the logic of our own explanations ready before us. Most relevant is the logic of Darwinian explanations by natural selection. I think it will serve as a helpful reference point, to mark out the manner and extent to which Darwinism can countenance ends. I will try (in §a) to pull together a ‘Darwinian teleology’ from well-known resources in philosophy of biology. I will then locate (in §§b-c) the two candidate accounts of Aristotle’s teleology, in relation to this contemporary option. (So my strategy for understanding the gap between our biology and Aristotle’s, is to see how far Darwinism can build towards teleology, and then how far Aristotle can, with his philosophical resources, close the remaining difference.) Since this Darwinian teleology has answers to questions a and b above, the
comparison will make clearer Aristotle’s prospects for such success.

**a. Our evolutionary alternative.** I think a great strength of our evolutionary account of life, is its claim to answer these challenges (a and b). It explains precisely that feature of organisms which most motivates teleology: their (seeming) 'functional design'. While denying any cognitive source for this (apparent) functionality—any 'designer'—evolutionary theory explains it as due to an efficient-causal process whose overall 'logic'—natural selection—preserves certain aspects of design. I think it preserves enough, in fact, to read Darwinism as rescuing a remnant of teleology, a 'thin teleology'—rescuing it by showing it consistent with biology's efficient-causal explanations. By specifying the logic of this defensible teleology, we can better understand and evaluate Aristotle’s.

There is a way, after all, in which the function explains the organ, and the goal explains the (biological) process: the latter were selected for the former. The organ or process is as it is, because it had effects that improved organisms’ reproductive fitness. It was its having these effects, that explains the presence and the character of the organ or process. And it’s because these effects explain the organ or process in this way—by this efficient-causal logic—that we count them as its functions or goals. Here teleology is not an alternative to efficient-causal explanation, nor even a supplement to it, but instead a special case or variety of it. The function or goal explains, precisely by and in a broad pattern in the trait’s efficient-causal history. And reproductive fitness also explains, as the ultimate selective criterion, common to that pattern.

The common logic of natural selection provides a sense in which reproducing—producing a maximum of viable offspring—is each organism's ultimate end: it's the result its genes were ultimately selected for. Genes and (heritable) traits were selected for their impact on (reproductive) fitness, i.e. for how they have made organisms more able or likely to reproduce.\(^{189}\) So the organism’s specific features are

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\(^{189}\) I here set aside the many ways in which, as is well known, features may be explained by something else than selection: mutation, genetic drift, pleiotropy and ‘spandrels’. I will also ignore the question whether the ‘level of
generally explainable by citing that overall, structural E; these features are the lowermost xs or explananda. Each feature enhances fitness in some particular way(s)—e.g. by improving pursuit of prey, or raising resistance to disease—and these ways can themselves be treated as intermediate Es that are selected means to that top end. In this way, we can plot a system or web of Es comparable to that we modelled for Aristotle.

We can find analogues in this Darwinian teleology for the hyletic and kinetic sectors in Aristotle's. For we can plot those intermediate Es, and the xs they in turn explain, either synchronically or diachronically: the top E can explain either the organism's functional structure, or the sequence of its processes. So the cat's whiskers (x as a part) are explained as for sensing (E as the fitness-enhancing role), which is in turn explained as for reproducing (E + 1 as fitness itself). And the cat's eating of the mouse (x as a process-phase) is explained as for incorporating and using that mouse-matter (E as the fitness-enhancing goal of the process), which is in turn explained as for reproducing (again E + 1 as fitness itself). So we can treat Darwinism as a teleological structure explaining sub-Es and xs analogously to Aristotle's hyletic and kinetic teleologies.

It’s much more doubtful, however, whether Darwinism can support any eidetic teleology—in which the x would be something like 'catness', the form or life-type, and the higher Es would be genera, as broader life-types that catness is a strategy-for. Such explanation seems quite at odds with the kinds of taxonomy now in play in biology (and its theory). Dominantly, current biology groups organisms by their evolutionary relationships—‘phyletically’. A minority defends grouping by similarities in their structures or lives—‘phenetically’. But neither kind of classification seems to give higher genera the kind of explanatory role we’ve seen Aristotle claims.

In phyletic taxonomy, the cat is classified under a hierarchy of 'clades', which group it with expanding sets of other organisms with which it shares increasingly distant ancestors. A clade does indeed

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selection’ is the gene, rather than the organism.
'explain' the organisms it contains, insofar as it cites a certain ancestor for them (all). This common ancestor explains, in particular, a set of traits derived from that ancestor, and (for the most part) recognizable in altered forms in other members of the clade (though possession of these traits is not what defines membership in the clade—having that common ancestor does). However, it seems clear that this way higher genera explain within cladistics is not by their being ends. To class the cat as a mammal does explain it, but not by showing what the cat is more basically ‘for’. We can’t find the cat’s higher or truer ends, by grasping its descent from that ancestral mammal.

By contrast, phenetic taxonomy classes organisms by their overall similarities—which looks closer to Aristotle. But in an evolutionary context this approach sacrifices even the special explanatory power of clades. Outside that context, in the long-standing Christian paradigm, the shared traits indicate a divine idea of a certain kind of life, for which that biological kind was made. In this case discovering these commonalities discovers the cause why the organisms are so. In modern biology, however, phenetic taxa merely group; they don't explain, much less teleologically.

If there are no Darwinian analogues for Aristotle’s eidetic ends, we must doubt whether the latter can be naturalized. But the situation is more favorable for his hyletic and kinetic ends. The Darwinian analogues for these suggest answers to the two main challenges to teleology introduced above.

a) The first challenge for a 'naturalized teleology' was to show how ends can explain—consistently with our firm conviction that the true causes of things are antecedent states or events.

Darwinism, however, shows a way to give these nonintended Es a different kind of preexistence—not in a representation, but as a selective factor at work in the evolutionary development of that x. It is because ancestral xs did ancestral Es, that this x is here now, with its own tendency to do E; evolution

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190 In addition, the overall E of reproductive fitness doesn't lie along the dimension of broader and broader classes, but is a structural feature of the process by which each organism is formed.

191 I here rely on what has been called the ‘etiological’ or ‘historical’ analysis of functions, developed especially by Wright [e.g. 1973] and Millikan [e.g. 1989]. See n. 197 below.
converged on x, because that let it converge on E. So Darwinism justifies calling the E a cause that explains the x: this is really to say that ancestral Es were this kind of selective factor. Just as intentional teleology cites ends as a way of referring to preexisting representations, so Darwinian teleology cites ends to refer to that selective history. So it too grounds the end-causes in efficient causes explaining from past to present.

b) Our second challenge was to show how ends can be ‘good’—consistently with our conviction that science must be value-free or –neutral.

It's much less clear whether Darwinism can fit with this aspect of Aristotle’s teleology. It can, indeed, allow there to be a biological ‘good’ of a kind. It exposes a common logic in organisms’ evolution: how their features have been selected for a single overall criterion, reproductive success. This criterion penetrates so deeply into the source and identity of any organism x—and into the details of its parts and processes—as to constitute a sense in which this E is ‘good-for-x’. Just by virtue of the x having been so thoroughly designed for E, we may take it that E is a kind of good for x. Calling reproductive success the organism’s good need mean no more than that it has been designed this way. Darwinism can condone this minimal sense for a biological good. But this sense seems very much thinner than Aristotle’s, in ways we will need to examine.

A Darwinian teleology can be demarcated and defended in these ways. It has the strength, that its top E does indeed support the structure below it: it shows how all lower ends can explain—as functions of parts and goals of processes—or rather it explains through them. So its warrant is transitive, and when it answers those basic challenges to its own status as an E, it answers as well for the whole system of Es it supports. This system includes analogues to the hyletic and kinetic networks of ends, though not it seems the eidetic.

Now how do matters stand with Aristotle? Let's consider his system of ends alongside this Darwinian one. Can it likewise meet those challenges against teleology—by giving Es a ‘preexistence’ in efficient causes of the x, and by 'naturalizing' the claim that the E is 'good'? Our answers will importantly
depend on which top we give his teleology, the threptic or noetic. At first view, the threptic gives him a stronger position, more consistent with Darwinism, whereas the noetic saddles him with a god- and value-tainted antinaturalism. But we need to cross-examine this first impression.

b. Aristotle's threptic option. Let me first sketch, in two paragraphs, how this option initially appears, then proceed to examine this impression. The threptic end of preserving-generating (developed in §4a above) bears an obvious resemblance to selection's criterion of reproductive fitness. So if this is Aristotle's top (as proposed in §5a), it has the potential to support and explain a similar structure of means. His biology would be well-guided by that posit, in mapping organisms’ functions and goals. His hyletic or functional explanations of organisms will start from pretty nearly the same point as Darwin's: he will look for parts to serve wholes for the same ultimate E. And his kinetic accounts of organic processes will assign them goals contributing to a very similar end. Of course Aristotle may often mistake the specific 'routes’ by which a part or process serves that E—we’ve seen that he gets badly wrong the function of the brain, for example. But he's looking for functions of just the right sort; his mistakes are, relatively, in the details. He gets right the top E’s ‘content’, at least. By contrast this seems not to be so in his noetic line.

On this threptic reading, Aristotle’s main mistake is not about organisms’ ultimate E, but about why or how it’s an E—the sense in which organisms are ‘for’ it. It’s a matter of the logic by which that top E explains. Simply put: he misses natural selection, and so is cut off from understanding that explanatory logic. So it seems that he’s not really entitled to those explanations (his teleology), since he doesn’t see why they work. This mistake seems to generate his eidetic teleology—that third network of Es and xs, with which he tries to connect the hyletic and kinetic teleologies to the ultimate E of surviving-reproducing (to show how the latter explains them). Missing natural selection, he substitutes what seems a bogus

Matthews 1992, 193: 'it distorts things only a little bit to say, mimicking Dawkins, that, in Aristotle's view, individual plants and animals, including human beings, are survival machines for plant and animal forms.' Lennox 1992, 327: 'This naturalistic approach to teleology allows Aristotle to offer teleological explanations of organic parts and behavior that sound remarkably like modern "adaptational explanations."
connection, in that hierarchy of forms and kinds.

But before we study this problem about telic force, we should notice some differences even with regard to content: Aristotle’s ultimate E is not exactly the same as natural selection’s, even on the theptic reading. I’ll mention two differences. Though significant, neither I think is major enough to displace his map (of the hyletic and kinetic teleologies) very far from our evolutionary analogue.

i) Aristotle treats individual survival as the ultimate E, not—as our Darwinian thin teleology does—reproduction; we noted this difference in §4a. However, we also saw that he sets up reproduction as a subordinate or mediate E - 1, pursued as an achievable second-best to an unachievable immortality (i.e. the maximum of individual survival).¹⁹³ So his degree of fit with adaptationism (explanation by selection) will depend on how thoroughly he relies on this mediate end. The question becomes, how complete an explainer Aristotle takes this E - 1 to be.

On the one hand, he might think that this mediate E - 1 (reproducing) is a complete end (explainer) for organisms' parts and processes, and that the ultimate E of individual survival only explains them through that E - 1. We can diagram this:

\[ E : \text{surviving eternally} \]
\[ \uparrow \]
\[ E - 1 : \text{reproducing} \]
\[ \uparrow \uparrow \uparrow \]
\[ E - 2/a, b, c... : \text{all specific functions of parts and goals of processes} \]

Since individual immortality isn’t feasible, organisms are reaimed to reproduce—to perpetuate themselves in descendents; their structures and behaviors are all for this. In this case the extra top E (immortality) wouldn't alter his analyses of functional or kinetic structure. There wouldn't be xs explained by this E rather

¹⁹³ DA 415a26-b2: ‘For to organisms that are complete [Teleia] and not maimed or generating spontaneously, the most natural function is to make another like itself, animal [making] animal, and plant plant, in order to share in the eternal [tou aei] and the divine as they are able. For they all desire this, and for this they do whatever they do by nature.’ See the passages cited in n. 82 above. In the next section I consider another way to construe Aristotle's reasoning here: not personal survival but personal eternity is the ultimate E, and the personal is sacrificed for eternity, as achievable in the type.
than E - 1, no parts or processes 'designed' for preservation independently of reproduction.

Or, on the other hand, Aristotle might think that the top E of immortality does explain some features of organisms independently of their reproductive interests. He might think that living things bear 'traces' of the ur-project of immortality, unexplainable by the generative E - 1. Some features of organisms may be towards this E by different routes or means than that E – 1. So the situation would be:

$$
\begin{array}{c}
E : \text{ surviving eternally} \\
/ \quad \downarrow \downarrow \downarrow \\
E - 1/a: \text{ reproducing} \\
\uparrow \uparrow \uparrow \\
E - 2/a, b, c...: \text{ some functions/goals} \\
\end{array}
$$

For any such features (x, y, z) Aristotle's functional analyses would be, in principle, out of alignment with our Darwinian account. He would get wrong what they’re for.

It may be tempting to discount the second reading on the ground that 'nature does nothing in vain': devices for an unachievable immortality would, surely, be otiose. If reproductive success is the most we can have of immortality, why would we have parts or behaviors ‘for’ anything further? But the issue is complicated by the fact that while endless life isn't possible for an individual organism, longer life is. And this could be another E – 1 that competes with the E – 1 of reproducing.

If the ultimate threptic E is the individual’s persisting forever, there are in fact two ‘second bests’ to it. Each maximizes a different side to this ‘self-eternity’: one sacrifices eternity to self, the other self to eternity. Either aspect of that ultimate E could be given priority. Should it be as strictly as possible this self that survives? or should what survives be as strictly as possible eternal? The former stress within the ultimate E would give priority to self-prolonging, the latter to generating. Each sacrifices one aspect to secure the other.

Our evolutionary theory assigns a clear order here: living longer is a means to reproducing, because

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194 See n. 164 above, on this phrase.
it is reproductive success that is the ultimate selective criterion. The typical life-span and survival-efforts of (members of) a species are adaptations—selected because they have enabled reproductive success. Organisms of a type live longer or shorter, and 'aim' at survival however they do, because of ways those traits have favored reproductive success. Selection ‘values’ life beyond the reproductive span, only insofar as these aged improve the reproductive prospects of their progeny. And where progeny are sacrificed to self-life, this is because that choice, in that context, has, over evolutionary time, typically secured more (successful) progeny than those lost. Evolutionarily, surviving is worthwhile only as a means to reproducing.

It’s clear that Aristotle doesn’t subordinate living-longer to reproducing as completely as this. The very fact that reproducing is ‘for’ the top E of (individual) immortality—an E absent in evolutionary theory—shows his allegiance to the individual organism. His functional explanations refer much more often to the survival project than the reproductive—and don’t hint that the latter is the point of surviving. He treats most bodily structures as designed for survival; he uses the goal of reproduction more locally, to explain the sex organs (and sexual differentiation itself). Offspring are good to ‘leave behind’ [katalipein, Pol 1252a30], but death remains a bad thing regrettable as long as one can live well, and more regrettable the better one can live.

Aristotle’s teleology fixes on the individual life in a further way too. As we saw in §4a, the ultimate threptic E is not, strictly speaking, either individual longevity or reproductive success—neither of these goals or outcomes. For the real eidetic E is not the goal of threptic processes, but the aim of threptic

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195 What’s lost in reproduction is noted in DA 415b6-7: ‘it remains not itself but like itself, not one in number, but one in form’.

196 Sensation e.g. is explained as needed for obtaining food and hence surviving [DA 434a32-b2, b26-27].

197 NE 1117b9-11: ‘And the more he has complete aretē and the more happy he is, the more he will be pained at [the thought of] death.’ On the other hand see NE 1124b8 on being ‘unsparing’ of one’s life in dangers, because not every life is worth living.
activities, and these aim precisely at their own activity. Or, the aim is to perform these threptic activities excellently, i.e. with virtue/aretê. The real E is the energeia of this ultimate life-project, which occurs not ‘outside’ the individual’s activity (neither in descendents nor in its own later years), but in that activity—which, recall, is done ‘for its own sake’. All of this locates the E rather differently than our own selection theory will do.

ii) Another difference in Aristotle's threptic E is that he treats the individual organism as that whose survival-reproduction is basically at issue, not—as the now-ascendant version of Darwinism does—the individual gene. He shows no inclination to treat the whole organism as a by-product of a teleology operating at the level of its 'parts'. Organic parts aren’t for (the sake of) their own survival, but are wholly subordinate to that of the organism.198

Again, however, this seems not to diminish the aptness of his detailed functional and kinetic explanations. For even gene-selectionists allow that the organism is usually the design-beneficiary: genes are mainly selected for their contributions to the organism's overall fitness. 'Outlaw genes', successful at the expense of overall fitness, are exceptional. So the teleological reasons for parts and processes can still be well-mapped by Aristotle.

I think these differences in Aristotle's ultimate E still let him approximate—on this threptic reading—the adaptationist maps of biological parts and processes. He can be roughly right in his networks of xs and Es—in his teleology's 'content'. But more damaging are the differences in its logic or form. When we turn to basic questions about how or why these Es explain these xs, Aristotle looks to fall drastically short. This comes out clearly when we return to those two challenges to his teleology, and see his difficulty in meeting them.

a) The first challenge for teleology was to connect its explanations citing future ends, with efficient-

198 The inherent tendencies of the matter, which do indeed resist the unifying work of organism-form, are not towards or for survival. Earth, for example, tends to move towards the center.
causal ones citing past events. And surely this exposes a key weakness in Aristotle's account: although he might explain by the same functional pathways, he has no right to them. For he doesn't have Darwin's way of 'cashing out' his final causes into efficient ones, of rendering the E effective in the past of the explanandum. This means that he can't say how all organisms are 'for' survival-reproduction. He can't, that is, explain why this top, or in what sense it's an end that explains. Missing this, all of his Es lose their warrant. So he suspends his teleology, a vast mobile, from a point not qualified to bear it: why is it all for surviving and reproducing? He sees the top, but not why it's the top, and this prevents his explanations from being genuine.

I think that such must indeed be our ultimate verdict against Aristotle's threptic line—but also that this verdict comes on much narrower evidence, and finds a much subtler fault in him, than this broad statement suggests. When we think more closely about the structure of our own explanation by selection, we see that Aristotle has a decidedly complex relation to it. He indeed rules out some of this explanatory scheme, but other elements he insists upon, and still others he’s quite indifferent to. This complexity comes, in particular, in Aristotle’s way of tying his Es to material-efficient causes. What he misses of selection, and how this matters, lie in these details. In assessing this verdict (that he misses selection), let’s first hear the cases for and against him.

In his favor, some things should be said even if that verdict is conceded. Better justice should be done to Aristotle’s achievement: he makes an inspired—or we could also say eminently reasonable—posit, that living things are explainable by the E of survival-reproduction. Although he fails to see why or how that E explains, he can still use it to map the elaborate substructures of functional and kinetic means that E in fact supports. His detailed biological researches are well-steered by that overall hypothesis. Moreover—it might be added—he is really agnostic about teleology's why or how.¹⁹⁹ He maps all those Es while forgoing

¹⁹⁹ Gotthelf 1987b, 204: 'Readers of the corpus will search in vain for a detailed analysis of what it is to be (or come to be) for the sake of something.'
and indeed rejecting the usual guesses about it—the usual ways of grounding final in efficient causes, which is by citing a creator-god, or an indwelling mind. He doesn’t see why his Es explain, but he doesn’t rule out that they do so by selection. So he holds a place free for Darwinism.

But against him, it would still be the case that he doesn’t see why those Es explain. And indeed, isn’t he guilty here of errors of commission as well as omission—not agnostic after all, but ruling out any answer to that challenge? For he excludes, it seems, not just the creationist way of grounding final in efficient causes, but any way of doing so, including the one that turned out to be true, selection. For he insists, it seems, on the necessary inadequacy of any purely material-efficient explanation of organisms. Consider Met 988b6-11 against the materialists:

That for which actions and changes and motions are, they say is a cause in a way, but not in the way it is its nature to be a cause. For those who speak of thought or friendship class these causes as goods, but not as if any of what is either is or becomes for heneka these [causes], but as if motions were from apo them.

Selection would have to be a logic in what ‘motions are from’—in what he calls (material, non-hypothetical) necessity [anankê], and opposes to the for which. So he deliberately rejects, it seems, the thin teleology he needs, and clings, at this crucial point, both to anti-naturalism, and to ‘supernatural’ causes (both in our sense of nature).

As I’ve said, I think this charge does hold, but more finely or subtly than this presentation suggests. When we examine Aristotle’s rejection of material necessity more closely, we find it has a narrow target, and leaves him options for still grounding ends in efficient causes. In the last passage, for example, he rules out only a direct transposition of a final into an efficient cause: making the E a S(source of motion). When he dismisses Anaxagoras’ use of thought/nous as non-teleological, he means that he explains using nous as

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200 Though we should recognize too the many times he falls back on that way of putting his teleological point—treating either god or nature as making by craft [techne]. E.g.: PA 682a6 says that nature ‘wishes’ [bouletai] to make a single part control perception; GA 717a30 describes how the testes ‘have been contrived’ [meméchanémenoi].
an efficient causal power, not as the end at which process aims. To explain teleologically, Anaxagoras would need to specify, and begin with, what that *nous* is for or towards.

Aristotle’s criticism here of necessity-theory leaves open other, less crude ways of connecting Es with Ss, including that in selection theory. For in the latter, the ultimate E (reproducing) doesn’t, or rather doesn’t just, explain by being an S: its point is obviously not simply that reproducing, or reproductive capacities, cause living things. Selection explains an x (some heritable trait) as ‘for’ reproducing, inasmuch as its presence and properties are due to a genetic history in which ancestral xs were (relatively more) successful at reproducing. We should note the complex temporal role this gives to reproducing: the story cites it as something prior to this x it explains, yet as something consequent to those ancestral xs. Put simply, I think it is the way it is prior that lets reproducing explain, and the way it explains by being consequent to prior xs, that lets us count it an E for this x. Aristotle, I suggest, insists that Es should explain as being consequent—and only denies that they can lie in prior material-efficient causes, in ways that exclude this. So we must ask whether there is any way he too can find prior causes that are also—in a (perhaps extended) sense—consequent.

Since evolutionary theory manages to find its prior-yet-also-consequent causes (functions) within the structure of reproductive cycles of individuals, we naturally look here in Aristotle. Of course he too recognizes such cycles, each running from an organism's embryological start, to its moment of creating another organism like itself. However Aristotle thinks of these cycles in a way that seems to rule out the Darwinian point. For he thinks that species, with their distinguishing structures and lives, are eternal, not passing products of evolutionary change.\(^{201}\) Cats have always been made by cats, and will always make just cats. Offspring can differ from parents, but are always ‘like’ in keeping within the bounds of the species’

\(^{201}\) On the eternity of species see especially Lennox 1985; he argues that although ‘kinds’ of organisms are eternal, forms are not—where a kind is ‘a continuous generation of individuals which are the same in form’ [141]. See Cooper 1982, 202ff on the significance of the eternity of world and life; also Irwin 1988 524-5, n.25.
body- and life-form. So there was and can be no period of design, in which the species-structure and species-life are assembled and developed by selection.

Still, there are other ways Aristotle can think of these cycles, which will still give his E an efficient presence in them. I think he has two broad options here. He can locate the E-constituting logic either in the internal character of each cycle (intracyclically), or in a cycle’s relation to other cycles (intereyclically). Each of these brings his threptic line closer to our own biological explanations than we expect. Each has been defended (in other terms) by recent interpreters. Our interest is in the ways each lets the E (first) explain in or through prior efficient causes, yet (second) remain in some way ‘consequent’ or futural.

On the intracyclical line, Aristotle treats teleology as fully constituted within each cycle (i.e. each cycle is sufficient to constitute it). We have already met some exponents of this line above, in what I called the ‘dunamis-analyses’. They hold that there is something in the individual dunamis, as it ‘is now’ within a given cycle, that suffices to make immortality an end for that cycle. It’s something in how this organism aims, in its own right and independently of its relation to other cycles, that constitutes that E—i.e. makes it the case that this outcome explains. So on this intracyclical reading of Aristotle,

An end is constituted by being: any outcome which a (certain kind of) dunamis tends to cause.

This gives Aristotle a position analogous to recent ‘dispositional’ analyses of functions, developed e.g. in a well-known paper by Bigelow and Pargetter. These analyses interpret end-directedness as a certain kind of causal disposition or tendency.\(^2\)

I take Gotthelf to read him this way in 1987b. As we began to see above, he analyzes [217] the E in

\(^2\) The different versions of this dispositional approach identify in different ways what special feature makes some dispositions end-directed. Some argue it is the (behavioral) ‘plasticity’ of the disposition, the way it adjusts behavior to conditions so as still to reach its outcome; examples are Braithwaite 1953, Nagel 1977. Others argue it is the disposition’s involving a special kind of mechanism, such as a ‘program’, or ‘feedback’; see e.g. Bennett 1976, Mayr 1988. And others specify the kind of outcome the disposition must have—for example that it plays a role in some larger system. Bigelow and Pargetter specify this outcome as the organism’s fitness: x has a biological function iff it ‘confers a survival-enhancing propensity on a creature that possesses it’ [1987, ]. Note how all of these analyses are ‘intracyclical’: the character of a single cycle, its disposition, is sufficient to determine it as for an E.
terms of an ‘irreducible potential [dunamis] for form’—a kind of causal disposition or S, which is defined by the outcome or E it tends to bring about. This potential is irreducible in that it is not analyzable into simpler causal powers ‘in the matter’ of the organism. This potential is present from the beginning of any cycle: it’s the embryonic power in the seed, that eventually produces the adult organism. Gotthelf thinks this shows [238] the priority of the kinetic to the hyletic teleology: bodily structure is for Es because it has been made so by the genetic process. So an organ is for surviving-reproducing, because the embryo already was. And the embryo is for these threptic Es inasmuch as it possesses a potential to effect these outcomes, a potential that can only be identified by them.

Now of course the dunamis in the embryo is itself explained by the parent and the parent’s own irreducible potential. But it’s not necessary to refer to this source, to establish what the E of this dunamis is. Each individual is, self-sufficiently, for (the sake of) its form by virtue of the character of its own dunamis: it has this E by or in itself. And it is ‘one in form’ with its conspecifics by virtue of the likeness of the forms each has individually—and not by virtue of the causal relations among them.

It may seem to count in favor of this reading, that Aristotle treats (as we’ve seen) the generative project as ultimately the individual organism’s effort at its own immortality. For if the dunamis is ultimately for the individual’s eternal persistence, we expect its E must be set within this individual. However this does not really follow. Although the individual aims at its immortality, it may not, so to speak, ‘aim itself’ there, but may be aimed there by the processes in previous cycles—as we’ll shortly see. That is, its being aimed there may depend (not just causally but essentially) on how it was caused by past generations. Perhaps each generation aims the next at immortality, as a means to its own.

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203 Gotthelf [1987b, 241] compares Aristotle’s position with Wright’s etiological account of function: the organ is ‘‘there because” … of what “the nature does” in embryonic development’. But as we’ll see, Wright’s etiological analysis won’t work for his ‘irreducible potential’ itself—won’t treat it as for an E.

204 Gotthelf 1987b, 242: ‘[this] makes the individual prior to the species for purposes of explanation’.
The great weakness of this intracyclical reading is that it doesn’t let the E explain the embryonic *dunamis*, only the structures and processes that result from it. As a result this reading sacrifices too much of the explanatory role that Aristotle wants this E to have. It doesn’t really let the E explain, just the disposition to E, which E itself does nothing to explain. By resting explanations on these dispositions, I think Gotthelf’s Aristotle has really just a version of the necessity-theory we saw Aristotle arguing against above. It is not, as it were, because of what surviving-reproducing is, that these irreducible potentials are for it. But Aristotle wants more in his teleology: his powers are for ends, because of what these ends are; what they are, explains why the powers are towards them.

I think an intercyclical way of grounding Es in Ss can do better, in preserving some explanatory power for the Es. It can do so by identifying the Es in relation to Ss in prior generational cycles. Of course Darwinism explains by an intercyclical logic—selection—but we’ve seen that Aristotle is barred from this by his eternalism about species. Is there any different such logic he might mean? He shares with Darwin the observation that all of x’s ancestors accomplished E—reproduced. He might also agree that these ancestors thereby outperformed others, and that this success was due to the relative fitness of their traits. He accepts inheritance of such differences. So it is open to him to explain the presence of traits in x by the E (reproductive fitness) they gave x's ancestors. On this intercyclical reading, Aristotle holds:

*An end is constituted by being: an outcome of a dunamis whose past achievement causes the dunamis to be present now.*

So he has a certain etiological ground for his teleology.

An intercyclical reading of Aristotle’s teleology has been suggested by several interpreters, and

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205 Bigelow and Pargetter argue [1987, 193] that their analysis makes functions explanatory of survival, but this reverses the direction of teleological explanation.

206 We might hear a suggestion of Aristotle's instinct to explain form by past cycles, in his expression for essence, *to ti én einai*, 'the being what it was'.

developed most fully by Furley [1996]. He tries to show that Aristotle can have some of the etiological justification for Es available to evolutionists. Although kinds don’t undergo modification towards their reproductively-fit versions, it is still their reproducibility that explains why individual members are here now. So Furley [1996, 73]: ‘The cause of this individual’s possession of this part, then, is the fact that this part is good for this kind of animal and therefore was a part of the form inherited from the parent.’

There is, I think, relatively little direct evidence in Aristotle of this etiological line. But he does suggest it in Met 1072b30-1073a3:

Those who hold, as the Pythagoreans and Speusippus do, that the most beautiful and best is not in the source, since the sources of both plants and animals are causes, but beauty and completion are in things from [after] these, are not correct. For the seed is from other [individuals that are] earlier [and] complete, and the first is not seed but the complete [individual], as one would say the human is earlier than the seed, not the [human] coming to be from it but the other from which the seed [comes to be].

Here it is the presence of the outcome in prior cycles that makes it a first explainer.

On this intercyclical reading, the point is not simply that a trait’s reproducibility in prior cycles explains its presence now, but that this constitutes the trait’s being ‘for’ reproduction. So organisms have their threptic Es in their causal histories. The character of an individual dunamis, by itself, is not enough to make its tended-outcome be its end. On this reading Aristotle relies on an etiological analysis of these

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208 Earlier in the paragraph Furley clarifies how the part is ‘good for’: ‘the possession of this part enables its possessor to survive and reproduce’ [73]. Perhaps Aristotle’s theory should here be read in relation to the ‘weak’ version of the etiological theory developed by Buller [1998, 508-9], in which a function depends not on there having been prior selection for it, but merely its own prior fitness.
threptic Es, analogous to that developed by Wright [e.g. 1973, 1976] and Millikan [e.g. 1984, 1989].\textsuperscript{209} The \textit{dunamis} in the seed is for these Es because the achievement of those outcomes in prior cycles explains its presence now.\textsuperscript{210}

How does this etiological sense for ends fit with the other basic sense we’ve seen Aristotle gives them—in his eidetic teleology? There ends explain downwards through hierarchies of kinds of organisms, each defined as a strategy for some more general and basic project. On the threptic reading of that teleology, Aristotle names the E of surviving-reproducing as his ultimate project, and ultimate explainer. On the intercyclical version of this reading, Aristotle wants this ultimate E to explain by being the repeated past outcome that lets the \textit{dunamis} be present now. So Aristotle can plausibly think that these explanatory methods reinforce or complement one another: as we generalize out to the broadest project shared by all organisms, we arrive at the common logic by which all those projects can be as they are.

What all organisms have crucially in common, we discover, is their project to survive-reproduce. And they have this project not just by having the capacity, but by also being caused by this capacity (in ancestors). What we discover in the highest genus is not just a shared capacity, but a shared etiology. And all the downward-branching kinds of organisms are likewise laid out this way. So e.g. blooded animals have in common a certain broad strategy for reproducing—and what gives them this strategy is not simply their possession of the relevant powers, but the etiological fact, that these powers explain how these organisms exist with these powers now. Among these subordinate strategies, indeed, are the aesthetic and noetic projects—understood on this threptic reading as particular methods for surviving-reproducing.

This intercyclical reading is attractive not so much because of textual support (which is limited or

\textsuperscript{209} Wright [1973, 161] gives this analysis: ‘the function of \(X\) is \(Z\) means … (a) \(X\) is there because it does \(Z\), (b) \(Z\) is a consequence (or result) of \(X\)’s being there.’ So in Aristotelian terms, a part or process occurs in an organism because it serves surviving-reproducing, and the organism survives-reproduces because of the part.

\textsuperscript{210} Charles 1988 attributes an etiological analysis to Aristotle: ‘The \textit{sperma} is as it is, and follows the route it does, because this is appropriate for its goal’ [41; also 39; he cites Millikan in n. 58].
indirect\footnote{Furley [1996], strikingly, offers little or no such evidence.}, but because it gives Aristotle his best chance of answering our first challenge—of connecting his ends to material-efficient causes. It gives his teleology more explanatory legitimacy than we expect; it lets it get right part of the logic of Darwinian selection. Indeed it could be argued that Aristotle wants or needs precisely the way Darwinism extends or expands selection: though he was barred from seeing the full structure of selection by his conviction that species are eternal, it in fact supplies just the kind of explanatory power to ends, that he wants and claims. So if the texts do not prevent it, it is attractive to read Aristotle in such alignment with the truth as we now know it.

However we must also recognize weaknesses in this reading—and in the position it assigns to Aristotle. On the one hand we need to see how this reading would still leave him badly mistaken about teleology: how he still gets it wrong in ways that badly skew his theory. And on the other hand we must notice doubts whether this really is Aristotle’s basic sense for his end or for which. There are other things he says about ends that it can’t well fit, and that will lead us to the noetic reading to follow.

First, Aristotle still misses the major part of selection. His part allows him to explain only why species persist, and not how they come to be in the first place. Organisms that possess the species-capacities are able to replicate themselves, whereas those whose matter isn’t fully enformed with these capacities die off without passing on their characters. (Aristotle here assumes, of course, that deviation from the type always renders less fit.) Such selection explains how types are maintained, but not how they originate. Aristotle rejects the need for the latter kind of explanation, because he denies that life-types do come to be. It would be tedious to harp on this basic mistake. But we should notice how it leaves him with explanations that have, even in his own eternalizing terms, obvious gaps or holes.

We can see this by noting that he has no explanation why just these species exist. Why not instead or also others we can imagine, which might be as or more survivable? That a certain package of capacities
is able to reproduce itself, is a necessary but not a sufficient condition for a species with those capacities to exist. Aristotle’s only way to explain why such imaginable alternatives do not exist, is that matter is not able to support their packages of capacities.\textsuperscript{212} So he argues, for example, that the limited quantity of earthy stuff in an organism can be used either for teeth or horns; PA 663b36-664a3: ‘So none of the horn-bearers is toothed in both [jaws]; for they lack forward teeth above; for taking away there nature adds to the horns, and the food [usually] supplied to these teeth is used up in growing the horns.’ There are, to be sure, echoes of this argument in modern biology. Still, Aristotle has no real chance of showing how matter’s limitations could carve out just the species-bodies and –lives we see.

Not only is this etiological reading less fully attractive than it had seemed, but there are also grounds for doubting whether Aristotle actually held it. We’ve noted that the positive evidence is indirect or inferential. It seems unlikely that he consistently saw Es in this sense, given the absence of overt statements of the logic of selection when he speaks about ends. The intercyclical reading also seems contradicted by Aristotle’s allowance for ‘spontaneous generation’: many kinds of organism are generated from inorganic matter, not by other individuals of their kind. These organisms would not have ends, if we take the etiological analysis strictly.\textsuperscript{213}

Nor is it simply that he doesn’t quite reach this idea. He gives evidence of having a different idea—of insisting on a teleology in some ways ‘stronger’ than on this etiological line. Gotthelf thinks the teleology is stronger by ruling out the kind of ‘reduction’ to material causes the etiological reading would

\begin{flushleft}\textsuperscript{212} Or the problem might be put this way: no particular structure is necessary for any of the threptic functions, so how can the latter explain any such structures? So Pavlopoulos [2002, 161]: ‘If blood is not a necessary condition even of nutrition, how can the presence of blood be hypothetically necessary?’ Hempel [1959] famously criticized functional explanations as not entitled to the assumption of ‘functional indispensability’ (i.e. that only such a part could perform the function).
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\begin{flushleft}\textsuperscript{213} Lennox 1982 accepts this limitation of teleology: ‘spontaneously generated organisms lacked, in Aristotle’s understanding, this formal identity between productive agent and end product and thus were not teleological’ [235].
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allow.\textsuperscript{214} I will put it rather as Aristotle’s insistence that ends should explain as futural. The etiological reading makes ends explain as ‘past futures’, i.e. as outcomes the having of which has caused this \textit{dunamis} to be present now. The E that explains is principally in the prior cycles, and only by projection or extrapolation in this x’s own.\textsuperscript{215} I think Aristotle gives strong signs of wanting Es to explain ‘from the future’ in a stronger sense, which I’ll develop in §e below.

b) The second large challenge to teleology was against its reference to its Es as 'good'; teleology must either expel/dispense with such references, or else naturalize them, by analyzing 'goodness' to make it amenable to scientific study. Aristotle so stresses the goodness of Es, that we must look to the latter option. He insists not only that Es are good,\textsuperscript{216} but that they explain by being good, they explain \textit{as good}. So he faces the further challenge of naturalizing goodness as a causal factor. Since one of his main objections to material-efficient explanations is that they leave out this reference to the good, his problems with these two challenges are linked.

Here too Gotthelf's effort to naturalize Aristotle is instructive. He argues \textsuperscript{[1988]} that Aristotle defines goods in terms of ends, not ends in terms of goods. And since his ends can be naturalized by the analysis we considered in a), this lets him naturalize goods in turn: to call something good is simply to identify it as the (achieved) result of one of those irreducible potentials.\textsuperscript{217} Gotthelf thinks this in turn explains why \textit{energeia} is good.\textsuperscript{218} This equation of goodness and activity is all the more plausible, since the

\textsuperscript{214} Gotthelf argues \textsuperscript{[1997, 79ff.]} against the effort by Bradie and Miller \textsuperscript{[1984]} to assimilate Aristotle to contemporary biological teleology: ‘in the face of contemporary physics and biochemistry, Aristotle would very likely retreat to a version of 5b’ (an etiological analysis of ends).

\textsuperscript{215} Bigelow and Pargetter \textsuperscript{[1987]} criticize the etiological analysis of functions as too ‘backward-looking’.

\textsuperscript{216} NE 1094a2-3: 'the good has rightly been declared, that at which all things aim \textit{[hou pant' ephietai]}'.

\textsuperscript{217} Gotthelf 1987b, 214n18: 'Since a naturalistic account can thus be given of the notion of the good with which Aristotle operates in his biology, it seems to me that the fundamental account of the final cause need not make use of that notion.'

\textsuperscript{218} Gotthelf 1988, 130: 'This is itself probably a consequence of two principles, that "goodness" designates what is
capacities to be activated are the threptic powers for self-preserving. So Politics 1261b9-10: 'surely the good of things must be that which preserves them'.

An alternative strategy is to concede that ends must be understood as good—but treat that goodness as cashed out in naturalizable terms, i.e. in properties biologists can discover. So Furley [1996, 66] stresses how Aristotle treats a goal as necessarily a good, but treats this good as (except in the human case) ‘always related to the animal’s capacity for surviving in its environment’.

But I think these efforts to make ends’ goodness either derivative, or easily naturalizable, both carve too much out of Aristotle’s teleology. He means to give goodness a richer role. It’s because threpsis, aisthesis, and noesis are all good, that there are plants, animals, and persons that pursue them. But to pursue this richer role we should turn to Aristotle’s noetic option.

c. Aristotle’s noetic option. In §5 the evidence seemed stronger that Aristotle treats noesis, not threpsis, as the ultimate project. If we do read him so, what answers will he give to our questions about the logic of his explanation by ends? This noetic reading promises a 'thick' teleology that retains the strong claims, jettisoned by the threptic approach, about how ends explain, and explain as good. However these strong claims seem to lose most of the threptic view’s plausibility. They apparently ruin our effort to set Aristotle into alignment with Darwinism. They spoil his naturalism by making Es mysterious explainers, mysterious in particular by being (in a strong sense) ‘future goods’. I’ll look at these doubts against the strong teleology bound up with his noetic line; then I’ll sketch what I think is Aristotle’s best position here.

To begin with, Aristotle's noetic option loses the threptic's nearly-right guess at the ultimate E in selection theory, reproducing. If noesis (thinking, as complete activity) rather than threpsis is the ultimate

\footnote{Gotthelf 1987b, 214: 'for (what we would call) meta-ethical reasons the good is defined by reference to [the] mature state' in which the organism has 'maximal powers of self-maintenance'.}

\footnote{Also Meyer 1992, 811.}
eidetic E, Aristotle will begin his teleological explanations from the wrong place. He will interpret parts’ functions and processes’ goals as ultimately for (the sake of) an E that in fact plays no explanatory role—as our own biology has found. Mistaking the ultimate E will presumably distort or misaim his whole teleology—making it mis-map all the detailed links of xs and Es.

However, Aristotle does at least treat the threptic project as a means or approach to that noetic E. So the extent of damage to his telic mapping will depend, once again, on how ‘complete’ he thinks this subordinate E, threpsis, is. Just as earlier we asked, within the threptic project, how complete an explainer reproducing might be (‘screening off’ the ultimate E of immortality), now we ask how complete an explainer the whole threptic project is, if the noetic project is indeed ultimate. Since plants and animals are incapable of noesis (and since ‘nature does nothing in vain’), are they thoroughly designed for the threptic E alone (surviving and reproducing), as the closest they can come to thinking? Then only humans would have parts and processes for noesis and not for threpsis. We can diagram the situation:

\[
\begin{array}{c}
E : \text{noesis (complete activity)} \\
\uparrow \\
E - 1 : \text{threpsis (reproducing)} \\
\uparrow \\
/ \\
E - 2/a, \ldots : \text{functions/goals of plants/animals} \\
\uparrow \\
E - 2/x : \text{functions/goals of humans}
\end{array}
\]

If so, Aristotle would still be right in the end by which he explains most of life.

But I don’t think Aristotle considers his ultimate E to be as fully ‘screened off’ as this. He uses the E of *energeia*/activity to explain animals in ways our selection theory won’t countenance. Animals’ aesthetic powers are the most obvious case: sight, for example, isn’t just for helping see-ers to survive and generate; it brings them closer to the noetic E than merely threptic activities do. Animals have these powers not just to preserve themselves, but in order to share more fully in divinity than plants can do. So some of the functions and goals explaining non-humans get explained directly by the ultimate E. Still, Aristotle does not invoke this non-threptic E very often; he treats threpsis as a complete enough E, that most of his
functional accounts of plants and animals are rightly aimed.

More damaging than this impact on the functions and goals he discovers, is the way Aristotle’s noetic line seems to spoil the very sense of these ends—to take away their chance to be genuinely explanatory. On this line he can’t rely on the part of selection he may have understood, to give an etiological grip to his ends—to render them real explainers. If threpsis were ultimate, it could be because—as the intercyclical reading has it—it was the ability of a *dunamis* to reproduce itself in prior cycles, that explains why the *dunamis* is here in this cycle now. But if noesis is the ultimate E, it must be an end in a different sense than this. Aristotle needs some other way to make this E explanatory—some other way to cash it out in the kinds of material-efficient causes we demand. We don’t see what this can be. So we suspect that he suspends his whole teleology from an ultimate E that can’t be naturalized, and so can’t support that structure. This E can’t show how any of the lower Es could really explain, either; it casts all the teleology in doubt.

Indeed, Aristotle doesn’t just lose this best chance to naturalize his ends, he seems to deliberately insist on ends in a thick sense that—we suspect—can’t be naturalized. He makes noesis an E in ways that seem especially resistant to any effort to ‘cash them out’ in our material-efficient causes. As before, I’ll focus on two points. In this thicker teleology: a) it's the E as future that explains, and b) it's the E as good that explains. We found partial or metaphoric ways in which the threptic line could make these claims. But it seems that Aristotle wants ends to be futural and good in much stricter senses.

a) Selection lets the E explain, only inasmuch as its ancestors (i.e. ancestral achievements of the E) explain. In the usual example: it was the ability of ancestral hearts to pump blood, that explains why this heart is here now—and why it’s able to pump blood. Here the E that explains—pumping blood—is futural only within each ancestral cycle: it’s futural only to past hearts, not to this one that the function explains. It’s the achievement of those prior Es that is the real explainer, not any E that is really later than this heart that’s explained. But I think Aristotle, especially when he treats noesis as his ultimate E, intends to explain
by something more ‘futural’ than this etiological analysis provided.

That the noetic E does not explain ‘from the past’ is shown, first, by the fact that it even explains xs whose ancestors did not achieve that E. It explains plants and animals even though their ancestors—prior members of their kinds—have always been incapable of noesis. (By contrast, the threptic line stresses that all of x’s ancestors must have succeeded in reproducing.)

It's this x's E, what this x is for, that explains it, not the Es of its ancestors. So the E explains ‘from the future’ of this x—meaning the telic future. The E that explains is the E this x is towards. We’ve seen that this E can be co-temporal with the x, as in the cases of functions of organs, and aims of activities. But this E certainly does not precede the x, as the etiological story demands.

b) We saw that on the threptic line Aristotle has prospects for naturalizing the goodness he wants to impute to Es. We noted two options: Gotthelf’s way of defining ‘good’ in terms of ‘end’ (such that to be good is simply to be an end), and Furley’s way of defining ‘good’ in terms of selective advantage (and then defining ‘end’ in terms of such goods). Both options let Aristotle naturalize goodness as something the scientist can legitimately study. But Aristotle's noetic line again resists this thinning of teleology. Noesis explains as good, and its goodness lies neither in its (already) being an end, nor (of course) in its being of selective advantage.

So first, against Gotthelf, Aristotle thinks that ends explain as (independently) good—i.e. they are good prior (logically) to their being ends, and this goodness is what lets them explain. Thus Met 988b14-15 criticizes his predecessors because 'they do not call [the good a cause] absolutely [haplós] but only incidentally.' E is an end because it's good, not good because it's an end. Above all, the ultimate E of divine thinking explains as (by being) the best good. Aristotle requires the theorist to make judgments

\[221\] Phy 194a32-33; cf. EE 1218b7ff. Cooper 1987, 245: 'Aristotle understands by a goal (hou heneka), whether natural or not, something good (from some point of view) that something else causes or makes possible, where this other thing exists or happens (at least in part) because of that good.'

\[222\] GA 731b26-27: 'that which is fine and divine is always, by its own nature, the cause of the better in what is
about good that transcend the taking-for-good involved in end-directedness.

And second, against Furley, this independent goodness does not consist just—or principally—in surviving-reproducing, i.e. the selective criterion we might consider a ‘naturalized good’. This threptic E is a means or second-best to the noetic E of thinking, as thorough or complete activity. And it looks much harder to naturalize this noetic good—hard even to define this ‘activity’ in a way that would let our science identify it, much less discover it as good.

Both of these stronger requirements—that the E explain as futural and as good—seem inconsistent with naturalizing Aristotle’s ends. Even so, I don’t think this task is hopeless. We need to look for a different kind of ‘logic’ in developmental processes, than the selective logic that grounded etiological ends. This different logic needn’t be incompatible with natural selection, and there may be parts of this logic that Aristotle once again can have. Let’s look first for a sense in which Es might explain ‘from the future’.

a) I interpreted Aristotle’s threptic line in relation to a modern etiological analysis of ends as constituted in selection. We saw that Aristotle can have some of selection, hence some of that intercyclical, etiological sense for ends. In this light Darwinism seemed a natural extension of Aristotle’s teleology, achieved by extending that selection to explain not just the survival but the origin of species.

I’ll read Aristotle’s noetic line in the same way: in relation to an evolutionary analogue that extends the logic of his noetic way of explaining. This analogue is a kind of completion of this teleology, arrived at by dispensing with Aristotle’s assumption that kinds are eternal. That assumption is obviously the crucial limit/defect in his biology. It’s instructive to see what his theory would be, without it.

Let’s start with a familiar evolutionary model: that of a 'fitness landscape', which represents the fitness-levels, for a given environment, of the genetic variations 'feasible' for a given species. This is a map, in other words, of the genotypic alternatives the species could reach by feasible mutations on its current genotype. Distance (from the current genotype) reflects how many mutations would be needed to reach a capable of it.'
given alternative. And elevation reflects how fit (how likely to reproduce itself) any such genotype is. Natural selection then tends to carry species upwards in this landscape, up to some fitness peak—and to maintain it there until the landscape changes (by change in the species’ environment).

Now consider whether we should say that by the logic of selection the organism is ‘attracted’ to such peaks. A nearby peak, as a merely possible genotype, of course exerts no literal force on the species: it doesn’t really pull the species towards it, since it doesn’t (actually) exist until the species arrives at it. Still, it is the character of this possibility—that it is fitter—that explains why evolution tends to arrive at it. The process tends, by its selective logic, towards this outcome because it has that property.

This suggests a different schema for explaining through selection—or a different way of couching such explanations. Let’s take as our explanandum some trait lying on a slope that rises towards a fitness peak. The etiological strategy explains this x by past selection for the functional powers and level of fitness x now has: it has them because those powers rendered its ancestors (relatively) fit. But the new strategy—which I’ll call ‘projective’—explains x by the still greater fitness lying ‘ahead’ of it, and which selection was and is carrying x towards. By the selective logic working upon the species, it has a tendency to ‘find’ that nearby peak, and its position on the slope beside that peak gets explained by its tendency up that slope towards that peak.

So an outcome is not an E because its occurrence in previous cycles explains a current tendency towards it. Rather, it’s an E because the logic of selection tends to carry evolution towards that outcome. Again the point is intercyclical—it presupposes a replicative process. But now the intercyclicality is prospective rather than retrospective: ends are constituted by possible future cycles. The E is not determined within any individual ‘on its own’, nor by its traits ‘having been selected’. It lies in the individual’s relation to descendents that ‘are being selected’, by a stochastic mechanism working on the individual and its descendents. The E lies in what x’s descendents will—by this logic—be able to do, beyond what x can do.
Now, to bring this projective schema closer to Aristotle—and in particular closer to his identification of *noein* as the highest E—we need to generalize this notion of a fitness landscape. We need first to generalize the Darwinian point, and think of a landscape projecting the fitness not for some species in a given environment, but for let's say 'plants', i.e. non-aesthetic organisms, in all the environments they inhabit. And then consider the claim that aesthetic powers are a high point of this landscape: a highly effective strategy for surviving-reproducing, is to perceive, desire, and pursue as pleasures certain conditions for so surviving-reproducing (in particular food and mates). The package of powers comprised by ‘aesthetic intentionality’ is a fitness peak that will eventually ‘attract’ evolution from some line of plants or other—so that animals (aesthetic organisms) will evolve.

Next, we can think of a new fitness landscape that becomes operative among such animals. Their common strategy—of steering by perception and desire—is itself capable of a certain development. To the extent that the animal can learn, i.e. reshape its perceptions and desires by experience, it will steer itself better towards pleasure—and will survive and reproduce better too. So a new fitness peak, amongst these aesthetic aimers, will be the capacity to generalize and reason over experience. A package of cognitive and rational powers will tend to evolve amongst these aesthetic aimers. And like the step to aisthesis, this introduces a new project not present before—the standard of having reasons that are good and true.

So next again, we can think of this new cognitive intentionality as setting up a third kind of selective landscape. Here transmission is by learning and ‘cultural transmission’, and the traits that succeed are those that are fit not reproductively, and not for pleasure, but for reason and argument. This sets up a third selective regime operating over the transmission (‘replication’) of reasons or arguments, whereby the stronger arguments tend to prevail and accumulate—over the long term at least. In this new fitness landscape, the highest peak will be the fullest possible possession of the reasons for believing and behaving.

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223 Compare Aristotle’s analysis of memory and learning at the beginning of *Metaphysics*. 
Evolution is towards an eventual insight into the good and the true.

This gives us an evolutionary analogue for Aristotle’s distinction among threptic, aisthetic, and noetic organisms. To bring this analogue as close to Aristotle’s explanatory strategy as possible, we need to think of this story as explaining from its end. Explanation begins with the ‘fitness peak’ of the last, noetic schema, with its grasp of goodness and truth, and explains the aisthetic and then the threptic from it. So the rough idea is that process will find this outcome—and is best understood in relation to that eventual achievement. Even though the threptic and aisthetic regimes precede the noetic—even though the latter evolves from them—we still need to understand them as partial steps, en route towards that ultimate grasp of goodness and truth.

Now of course Aristotle can’t have such an evolutionary theory, because he thinks that kinds are eternal. Still, just as we found a part of the (Wright-Millikan) etiological point, in his recognition that a trait’s past success explains its occurrence now, so we might be able to find a part of the projective reading of selection just sketched. Aristotle might recognize an intercyclical tendency for each generation to improve on the previous, by the standards of the threptic, aisthetic, and noetic projects. This tendency would be constrained by the limitations in the matter a given species en-forms; it would be because of these limits, that no long-term progress occurs. Still, it could be the outcomes towards which those three projects tend, that determine what they all are for.

However I think there’s less evidence that Aristotle thought this ‘projective intercyclical’ point, than that he thought the retrospective one. He says very little about the possibility of progress, even within the limits of a species-form; he doesn’t seem to think of generations as tending to become better and better. Although he does think of species as able to be roughly ranked by their approach to the good, he seems not

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224 By contrast, the ‘propensity analysis’ of functions by e.g. Bigelow and Pargetter [1987] uses fitness-propensities to explain future selection. The projective model uses the upshot of future selection to explain the ‘movement’ of selection now: selection is in the process of discovering that upshot.
to think of their reproductive cycles as tending to bring them towards higher kinds. So I think he lacks even the thinner version of the intercyclical point. His noetic teleology isn’t evolutionary even in this thin sense.

Nevertheless, I think comparison with this evolutionary argument still helps us here: Aristotle’s way of justifying noesis as the ultimate E is still projective in a sense. Even though these three basic life-projects don’t evolve into one another—and don’t even have a disposition (outweighed by other factors) to do so—they still stand in a certain sequence as projects (I’ve represented this as $T \rightarrow A \rightarrow N$). Aristotle thinks he can identify, by studying the less and more general kinds of organisms, three distinct logics, by which these organisms are for (the sake of) Es—i.e. are explained by outcomes. And Aristotle thinks these projects, with their different logics and different Es, stand in that sequence not because they have such causal dispositions (e.g. not because the threptic ‘tends to become’ the aisthetic), but because of ways these projects can be seen to improve on one another (later on earlier). The aisthetic improves the aim of the threptic, and the noetic of the aisthetic. Each improves the aim of the simpler project by raising a new project above it; by making a new aim take precedence. Each succeeds by the prior standard, but each adds a further E which shows itself an improvement on that standard—it reveals that standard as partial or incomplete.

So each eidetic project—threptic, aisthetic, noetic—has its distinctive E, and having a later E is the best means to securing the earlier. Each project also has a distinctive way of being towards its E, and the later ways improve on the earlier. Plants aim at surviving-reproducing merely by having a dunamis for this outcome (and a dunamis that is here because it has secured this outcome). Animals have this directedness, but they also have a very different kind: they are towards a quite different E (pleasure), and by intending it (by perception, desire, etc.), as plants don’t do. Humans have both of these directednesses, but again a further kind: they think Es as reasons for what they do. Aristotle thinks that this third teleology doesn’t just accomplish the others’ Es, it also completes or perfects them, as teleology. End-directedness ‘becomes
itself” in its noetic version.225

I think it’s this relation among the Es of the three life-projects, and this relation among their ways of being towards and for Es, that are Aristotle’s grounds for claiming that the noetic E is ultimate, and that it explains the projects of the others as well. We can see this better, by returning now to the question how Es could explain ‘as good’.

b) In one sense all three life-projects, and all kinds of organisms, are ‘for the good’—are explained by the good. The good is Aristotle’s ultimate telic explainer. But it’s only the noetic project, and (thinking) humans, that are for the good in a stricter sense: only they pursue the good as good. Or, it’s only in their case that the good is a proximate and complete telic cause of what they do. Plants and animals are ‘for the good’ only indirectly, and in their less adequate ways of being-towards.

Only in noesis is the E’s goodness adequately grasped or understood. And only in noesis is this goodness the reason for pursuing E; we’ve seen that noesis is crucially a power for ‘having reasons’. In this noetic case, the E really is good, and it is fixed on because it is good: if it had not been good it would not have been aimed at. So the E’s goodness explains the behavior that gets aimed at this E. Noesis is, as it were, ‘transparent’ to the explanatory role of this goodness: it adds no distortion, by mistaking what this goodness is, and thereby preventing goodness itself from being the reason for the behavior.

This priority in noetic activity is well-expressed in Aristotle’s term teleion—final (also translated complete or perfected). Such activity is teleion because it is most fully imbued with the E of goodness—most fully what it is, because of and as this goodness. Teleology—explanation by ends—is most completely the cause of such activity, and it’s least necessary to introduce material-efficient causes as co-explainers. I think this telic completeness is at the core of a group of ways Aristotle stresses self-

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225 Aristotle indicates the different ways different kinds of organisms are for the good, in Met 1075a118- : ‘For all have been ordered together towards one [end], but just as in a household it is least possible for the free [men] to do what chances, but all or most things have been ordered, but the slaves and the beasts [do] a little towards the common [good], but mostly what chances; for the nature of each of them is such a source.’
sufficiency; we’ve noticed this in activity (by contrast with motion), in *kath’ hauto* being, and in the self-
sufficiency of substance (versus beings of other categories). What it is that makes noetic activity the
ultimate E, is the way it is ‘most teleological’.

By contrast, in aisthetic directedness the E is the apparent good, not the good itself. Animals (and
humans when not noetic) guide their movements by desire for pleasures they imagine through perceptions.
Aristotle calls these pleasures ‘apparent goods’. How does he mean this? And why is he so ready to treat
this apparent good as interchangeable with the good? So Phy 195a25-26: ‘Whether we call it good or
apparently good makes no difference.’ We have to explain both the distinction, and Aristotle’s reason for
sometimes ignoring the distinction.

The way it ‘makes no difference’, is that both cases are teleological: the explaining E can be the
good, or it can be the apparent good. Indeed, I think Aristotle holds that even when the E is the apparent
good—in cases of animal desire—the good also explains, as an E + 1. So the key difference between noetic
and aisthetic aiming, is in how proximately and completely the good explains.

Note first how Freeland [1994] argues for a different way the good might explain (even) in cases of
animal intending: animal self-motion is ‘directed toward a goal that is objectively good for [the animal]’
[51], by which she means that this goal helps it perform (or perform better) the activities enabling animals of
its kind to survive. Even in cases of mistakes (the hummingbird attacking its reflection), the action is still
(partly) explained by an objective species-good (fending off rivals); the aim at this good is just misapplied,
due to a perceptual mistake. Freeland here reads ‘the good’ as the theptic E of surviving-reproducing. But
I think Aristotle makes a similar argument, but taking noesis or activity as the good.

Aristotle treats the good as explaining even in the case of desire for pleasures—but it explains
indirectly, and only in conjunction with an explanation why this animal falls short of aiming at the good

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226 Also DA 433a28-29, MA 700b28-29, Met 1013b25-27. Woodfield complains [1976, 211] that this ‘encouraged
the conflation of two quite different conceptions of what an end is’.
itself. So here the respects in which aesthetic processes do ‘share in the good’—the ways they are guided by discrimination and intention—is the extent to which goodness does explain. And all the ways this process fails to be determined by the good itself, in which it fixes on its E by sensory powers and so imagines it as pleasure, require the introduction of non-teleological explainers, in particular the material-efficient limits of this kind of organism, which prevent it from thinking the good.

Threptic processes are also explained by goodness, still less directly. We can distinguish several ways Aristotle thinks organisms survive-reproduce because doing so is (a lesser) good. a) Surviving is a precondition for all the aesthetic and noetic processes that are more directly ‘for the good’. b) Reproducing continues a cyclical motion that is a second-best to genuine activity. And c) in these reproducing cycles, processes are explained by their outcomes, in Aristotle’s thin etiological sense; so threpsis involves a simpler, non-intentional form of teleology, and is good as such.

So on Aristotle’s noetic line, which I think is better represented in his texts, it’s the good that explains, in that projective fashion. It explains, that is, by being the E of the life-project which realizes and perfects the aiming in the other projects. Not all Es are the good itself, but all Es explain in relation to this good. They explain in the manner of the good, though in partial and defective versions of it. Aristotle here relies on a claim about the meta-logic of teleologies, whereby the aims of these three life-projects are completed in noetic activity, done just because it really is good.

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227 As Freeland [1994] shows, Aristotle often speaks as if the threptic processes are more assuredly good than those steered by desire. I agree that they are less prone to error. But the aesthetic powers make their mistakes in an intentional space that is a fuller good.

228 Kosman 1994a, 149 points out how each part of cyclical process is just ‘as much the end as any other’, which mimics the character of activity as an ‘end in itself’.
Bibliography

Aristotle: Translations are my own, often by adapting those in J. Barnes (ed.), The Complete Works of Aristotle, [2 Volumes], Princeton University Press, 1984. I aim at literalness and consistency, often at the expense of grace. For the Greek I rely on the Oxford Classical Texts where available, and on the Loeb Classical Library where not (i.e. for Cael, GA, HA, and PA). I cite works using the following abbreviations:

- APo: Posterior Analytics
- DA: De Anima (On the Soul)
- Cael: De Caelo (On the Heavens)
- EE: Eudemian Ethics
- GA: Generation of Animals
- GC: Generation and Corruption
- HA: History of Animals
- MA: Motion of Animals
- Met: Metaphysics
- NE: Nicomachean Ethics
- PA: Parts of Animals
- Phy: Physics
- PN: Parva Naturalia
- Pol: Politics
- Sens: De Sensu (Sense and Sensibilia)


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