

## A CURIOUS MISTAKE CONCERNING CRANIAL SUTURES IN ARISTOTLE'S *PARTS OF ANIMALS*, OR, THE USE AND ABUSE OF THE FOOTNOTE

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It is difficult to speak of Aristotle without exaggeration: he is felt to be so mighty, and is known to be so wrong. (George Henry Lewes, *Aristotle: A Chapter from the History of Science*)<sup>1</sup>

Aristotle's biological writings have elicited high praise from those who study his work. For although from a scientific point of view they may have been rendered obsolete long ago, it is in these texts that some of Aristotle's most impressive qualities as a researcher and a thinker are to be found: his collection of massive amounts of data and the organization of all this material into a coherent whole. As Jonathan Barnes writes in *Aristotle, A Very Short Introduction*, "It is easy to become starry-eyed over the *Researches*, which are on any account a work of genius and a monument of indefatigable industry."<sup>2</sup> Naturally Aristotle, inasmuch as he had few tools other than patience and what must have been incredibly good eyesight, made a few mistakes. Some of these—such as his description of the European bison's ability to expel its feces to a distance of 24 feet, or his claim that male humans (as well as male sheep, goats and pigs) have more teeth than their female counterparts—have become notorious.<sup>3</sup> However, in some respects it is these very mistakes, and not Aristotle's biological observations themselves that are of interest

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<sup>1</sup> Lewes 1864, 1.

<sup>2</sup> Barnes 2000, 20.

<sup>3</sup> As Bertrand Russell noted, "Aristotle could have avoided the mistake of thinking that women have fewer teeth than men, by the simple device of asking Mrs. Aristotle to keep her mouth open while he counted," (Russell 1950, 103). Bison example quoted by Barnes, *ibid.*

to the modern scholar. Why were they made? What concatenation of events or erroneous assumptions might have caused Aristotle to make these false assertions? In the case of the European bison, it may have simply been that, in Barnes' words, "Aristotle was taken in by a tipsy huntsman's after-dinner yarn." But in the case of the dental inferiority of females in some species we might wonder whether Aristotle was led astray by the prevailing gender bias of his time. This, in fact, is what Robert Mayhew decided to explore in his 2004 study, *The Female in Aristotle's Biology*. Mayhew reviews a series of mistakes in Aristotle's biological writings all having to do with gender difference. Mayhew's objective was to determine whether these mistakes were the result of certain ideological presuppositions about males and females common to the ancient Greeks of Aristotle's day, or simply bad science. He concludes that Aristotle's mistakes were not dictated by cultural misogyny.

It is not my purpose here to assess whether or not Mayhew succeeds. Instead I would like to focus on one particular Aristotelian mistake he discusses, an erroneous claim concerning a different pattern of cranial sutures in men and women.<sup>4</sup> Mayhew's solution to this error was first proposed in 1882 by the translator and commentator William Ogle. However, since Mayhew is constructing an argument—namely that Aristotle is not influenced by gender bias in the case of cranial sutures—in addition to presenting Ogle's proposed solution he footnotes other scholars who have examined this Aristotelian mistake. In other words, Mayhew is relying here upon two different forms of scholarship: the commentary and the footnote. Consequently, Mayhew's discussion of the cranial sutures mistake affords an opportunity to think about how footnotes operate differently than commentary, both in terms of narrative voice and narrative desire.

The commentator's voice is her own and no other; it is univocal. Commentary offers an explanatory narrative, a possible

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<sup>4</sup> The cranial sutures mistake is a frequently cited example of Aristotle's fallibility, and often mentioned in conjunction with his mistake about gender difference and teeth. I suspect the reason is that both mistakes could presumably have been rectified with more careful observation, and thus they leave Aristotle especially open to the charge of cultural bias. In his 1955 study of Aristotle Louis Bourgey chooses the cranial sutures mistake, which he qualifies as one of Aristotle's "famous errors," to represent the entire family of mistakes behind criticism of Aristotle's lack of independence from ideology. Bourgey 1955, 84.

resolution of a problematic passage representing the desire to fix an aberration or to correct a mistake. And yet any explanation can be seen as an invitation (or demand) for further exploration and thus contains its own potential open-endedness and plurality. Writing about the classical commentary, Christina Kraus describes how the process of explaining produces “a kind of meta-narrative” with the ability to generate further narratives endlessly:

On a more (ludic) theoretical level, the give and take between the text and its commentary, and between the commentary and its reader, is a complex manifestation of the pull of narrative desire: a commentary becomes a kind of meta-narrative, a story told about, and around, a text based on the tension between the disorder created by a problematic, or multiply-meaning, source-text, and the order generated by the satisfaction of the text’s teasing answered—or only deferred?—by the commentator’s judgment; and in a kind of *mise en abyme*, on the tension between the meaning fixed by the commentator’s “answer” and the plurality of meaning(s) inevitably opened by the new paths suggested by the very process of answering.<sup>5</sup>

By contrast, in the footnote, the individual voice disappears. Via a footnote, an author joins a scholarly community, adding the *auctoritas* of other scholars to her own. As Stevens and Williams observe: “The footnote is written by an individual whose own voice has been rendered into a collective voice of similarly educated authors. That is, in the footnote the individual author purposefully loses his or her writerly voice to become part of this collective.”<sup>6</sup> In terms of narrative voice then, footnote and commentary are diametrically opposed.

At first glance, the same would seem to hold true for narrative desire. Commentary, as Kraus stated above, sets up a relationship between reader and text in which the desire to explain represents a singular answer that can theoretically never be permanently fixed in its singularity. Footnotes, on the other hand, inscribe the opposite trajectory when considered from the point of view of the author: the plurality of corroborating voices represents a desire to confirm a

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<sup>5</sup> Kraus 2002, 9.

<sup>6</sup> Stevens and Williams 2006, 211.

singular position or argument, and thus confer the stability of consensus. Commentary is potentially destabilizing; footnotes, in principle, are not. However, in terms of the relationship between *reader* and text there is another, different kind of desire operating in the footnote, one I would qualify as metonymic. Footnotes are textual abbreviations, sometimes literally and always figuratively. Like icebergs, they show only the smallest part of their entirety. A footnote is an invitation to know more, to see a bigger picture. It is this metonymic desire that I would like to explore, using Mayhew's footnote in his explanation of the cranial sutures mistake.

Unlike Mayhew, I am not particularly interested in the scientific accuracy behind Aristotle's observation. In fact, for the most part we read Aristotle's biological writings today more for meaning—how Aristotle understood the natural world and the creatures who live in it—rather than for scientific truth. Yet meaning and truth are not mutually exclusive by any means; they are constantly informing one another. What we must confront critically is our desire for fixed meaning and certainty in our endeavors, and the various temptations to overlook irregularities that this desire throws our way. By unpacking Mayhew's note and restoring what has been occluded there I want to transform his resolution of a perplexing passage into a destabilizing multiplicity of narratives. In Latin, to make a mistake (*errare*) is also to wander. Mayhew's presentation of Aristotle's curious mistake concerning cranial sutures provides an occasion to wander through a maze of scholarship in which footnotes, if allowed to speak fully—and especially if they are allowed to speak to each other—have interesting stories of their own to tell.

### THE MISTAKE

In Chapter 7 of the second book of *Parts of Animals* Aristotle says that among animals the human male brain is the largest with respect to his size, and that men's brains are larger than women's.<sup>7</sup> Here he is correct. The human brain is large for an animal of his size, and by and large the brains of men are slightly larger than those of women.<sup>8</sup>

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<sup>7</sup> ἔχει δὲ τῶν ζώων ἐγκέφαλον πλεῖστον ἄνθρωπος ὡς κατὰ μέγεθος, καὶ τῶν ἀνθρώπων οἱ ὄρρενες τῶν θηλειῶν (653a27). (Of animals the human has the biggest brain in accordance with size, and of humans males [bigger than] females.)

<sup>8</sup> Passingham 2008, 33: “The human brain is 3.5 times bigger than expected for an ape our size.” Blum (referenced by Mayhew) 1997, 37: “There is an

Aristotle goes on to say that men have more sutures in their skulls than women, and that the reason for this is that the sutures supply a place for the brain to receive air (to cool it down), and bigger brains (being hotter) require more sutures.<sup>9</sup> While this makes a great deal of sense from an Aristotelian point of view, he is wrong. Anatomically speaking, the skulls of men and women are identical; they have the same number of sutures.<sup>10</sup>

Two passages from Aristotle's *History of Animals* (1.7 and 3.7) offer additional details, and explain precisely what Aristotle meant when he said that there were more sutures in male skulls than in female skulls. In these passages he claims that the skulls of women have one circular suture, whereas the skulls of men have three, which come together in the shape of a triangle.<sup>11</sup> As we now know, the number of sutures in the adult human skull, not counting the bones of the face, is sixteen.<sup>12</sup> However, the most prominent are three in number: the coronal, which runs across the top of the forehead more or less from temple to temple; the sagittal, which bisects the coronal; and the lambdoid, which looks like the Greek letter *lambda* ( $\Lambda$ ) at the

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overall size difference [in the brains of men and women]: by weighing and measuring hundreds of human brains, researchers have found that, in general, men's brains are about 15 percent larger than women's brains.”

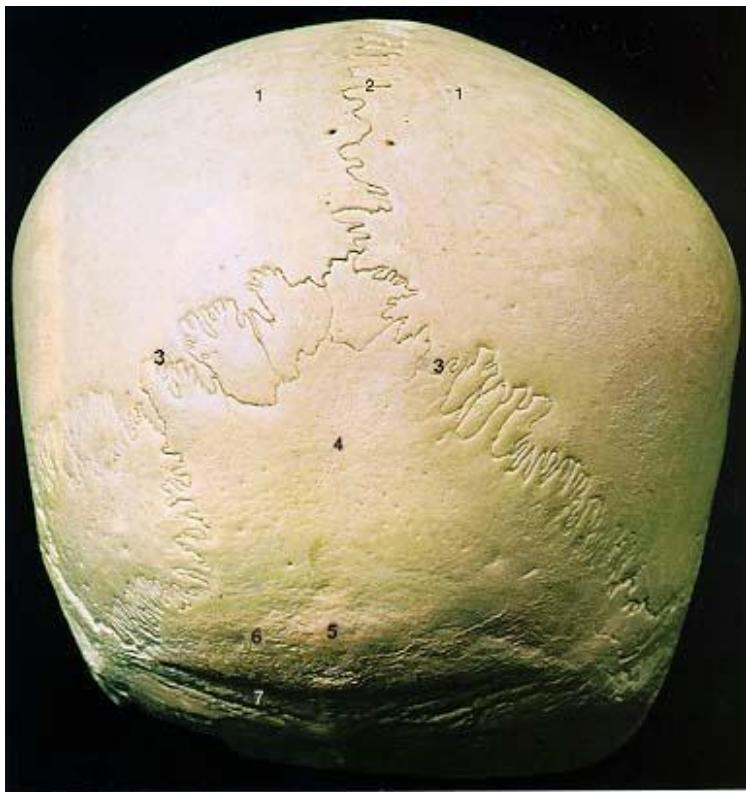
<sup>9</sup> καὶ ῥαφὰς δὲ πλείστας ἔχει περὶ τὴν κεφαλήν, καὶ τὸ ἄρρεν πλείστος τῶν θηλειῶν, διὸ τὴν αὐτὴν αἰτίαν, ὅπως ὁ τόπος εὔπνοις ἦ, καὶ μᾶλλον ὁ πλείστος ἐγκέφαλος (653b1-3). (And [a human] has more sutures around the skull, and the male more than females, on account of the same reason [i.e., the bigger size], in order that the place may have breath in it [in other words, be ventilated], and the more [breath] the larger the brain.)

<sup>10</sup> In fact, Aristotle may be wrong on both counts. According to Blum, research using PET scanning—positron emission tomography, a type of nuclear medicine used to create images of what is inside the body—suggests that the brains of women are actually slightly hotter than those of men. (Blum 1997, 53.)

<sup>11</sup> Book 1.7: ἔχει δὲ ῥαφὰς τῶν μὲν γυναικῶν μίαν κύκλῳ, τῶν δ' ἀνδρῶν τρεῖς εἰς ἓν συναπτούσας ὡς ἐπὶ τὸ πολύ (491b3-5). ([The skulls] of women have sutures that are one, in a circle; [the skulls] of men have sutures that are three, touching together at one [spot], for the most part.) Book 3.7: καὶ τούτου τὸ μὲν θῆλυ κύκλῳ ἔχει τὴν ῥαφήν, τὸ δ' ἄρρεν τρεῖς ῥαφὰς ἄνωθεν συναπτούσας, τριγωνοειδεῖς (516a18-20). (And of this [the skull] the female has a suture in a circle, while the male has three sutures touching together above, triangular in form.)

<sup>12</sup> *Dorland's Illustrated Medical Dictionary*, 2000, pp. 1738-9. Interestingly, this number may vary slightly depending upon which reference one consults.

back of the skull. Where the sagittal suture meets the lambdoid we see an upside down “Y” shape, or what appear to be *three* sutures—Aristotle would have considered the lambdoid suture to be two separate sutures—meeting at a triangular point, just as Aristotle described in the case of the male skull.



(Posterior view of the skull showing the sagittal and lambdoid sutures. Photo courtesy of Dr. James A. Strauss, Pennsylvania State University, Biology 29, *Human Anatomy*.) Note that Aristotle's total number of sutures does not include the coronal suture.

### THE SOLUTION

Mayhew turns to William Ogle, the 19<sup>th</sup> century translator and commentator of *Parts of Animals*, for a possible reason behind Aristotle's claim for different numbers of sutures in the skulls of men

and women. He writes, “William Ogle provides an explanation for how Aristotle might have come to this erroneous conclusion while at the same time being committed to the importance of observation.”<sup>13</sup> Mayhew then goes on to quote a section from Ogle’s note on this passage:

Of course the opportunities of seeing a female skull would be much fewer than of seeing a male skull; for battle-fields would no longer be of service. Still it is not impossible that A.’s statement may have been founded on some single observation. For it is by no means uncommon for the sutures on the vertex to become more or less effaced in pregnant women; so common indeed is it, that the name “puerperal osteophyte” has been given to the condition by Rokitansky [here Mayhew omits Ogle’s bibliographic reference, *Path. Anat.* Iii. 208, *Syd. Soc. Transl.*]. A woman’s skull may have been observed in which the Sagittal suture had thus disappeared; when the Lamboid [*sic*; the mistake occurs in Mayhew’s text, not Ogle’s], with the lateral sutures, and the Coronal, might fairly be described as forming together a circular suture. It must not be forgotten what great difficulty there was in A.’s time in getting a sight of human bones. (1882, 168n26).

I will return to Ogle’s proposed solution later. Here I note that Mayhew is primarily concerned with whether or not Aristotle actually saw a female skull that seemed to have only one suture. He does not question Ogle’s hypothesis that if the skull came from a pregnant woman, chances are that it would have the pathological condition discovered by Rokitansky leading to the appearance of a singular, circular suture. Or, in Mayhew’s own words:

Following Ogle’s lead, we can speculate that Aristotle perhaps had the opportunity to examine only a single female skull—or at any rate, not likely more than a couple—which came from a woman (or women) who died in childbirth or during a complicated pregnancy. He observed one suture in this skull (or these skulls) and so concluded

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<sup>13</sup> Mayhew 2004, 73.

that a man normally had three sutures, whereas a woman had only one.<sup>14</sup>

Recast in the language of our period, Ogle's solution sounds plausible. However, it still requires that Aristotle knew the skull came from a woman, that this woman died while pregnant, and that she had a pathological condition that would have changed the exterior of her skull. Given Greek attitudes towards burial and disposal of the dead, we must add to the various components of this speculation the question of provenance.<sup>15</sup> Where would such a skull have come from? A curiosity brought back from a foreign land? A grave accidentally opened in which a woman dead in childbirth was known to have been buried? Clearly support is needed here, and Mayhew obliges with a footnote, which reads:

Ogle's point is cited in Lloyd (1983, 102n165), and Dean-Jones (1994, 81); see Lennox (2001a. 211-12). D. W. Thompson writes: "I imagine that this singular misstatement dates from a belief that the sutures of the skull coincided with the margin and the partings of the hairy scalp" (1910, ad 491b4, n7).<sup>16</sup>

At this point it is worth pausing to consider the role of the footnote in scholarship that deals with texts like Aristotle's biological writings. Lloyd, Dean-Jones, Lennox and Mayhew himself are primarily classicists, not scientists. They must rely upon the scientific credentials and presumed accuracy of their 19<sup>th</sup> century predecessor William Ogle, who was a physician by training. They thus represent a unique intersection of author, text, and previous scholarship that follows neither the model of literary criticism, nor that of scientific texts. Von Staden addresses this point in an essay on Galen's commentators:

One consequence of the disappearance of the commentary genre from twentieth-century scientists' and doctors'

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<sup>14</sup> Ibid., 74.

<sup>15</sup> See Kurtz and Boardman 1971 who mention death in childbirth as meriting special treatment (331). It seems highly unlikely that the bones of a woman who died in childbirth would be readily available for observation.

<sup>16</sup> Mayhew, 74.

arsenal has been that commentaries on ancient Greek medical and scientific texts have largely become the *chasse gardée* of classicists (sometimes with little or no visible expertise in science), of a handful of professional historians of science trained in the ancient languages (particularly in the case of the exact sciences), and of an occasional specialist in Greek poetry. . . . Unlike Hipparchus, Galen, Eutocius, and other ancient commentators, some of their more recent counterparts display little or no interest in the scientific validity of ancient observations, concepts, or theories, let alone in the efficacy of the scientific practices presented in the ancient texts on which they comment.<sup>17</sup>

Mayhew's references, G. E. R. Lloyd, Leslie Dean-Jones and James Lennox, are all significant and influential contributors to the field of Aristotelian studies and ancient science in the late 20<sup>th</sup> and early 21<sup>st</sup> centuries. (Thompson, also mentioned in Mayhew's footnote, is a closer contemporary of William Ogle than of these scholars, so he will be dealt with separately.) Mayhew needs to reinforce Ogle's proposition—that Aristotle's mistake came from a skull affected by the puerperal osteophyte condition—with as much scholarly authority as he can muster, but, given that most of his readers will be classicists, he has chosen classical scholars rather than scientists to supply it. He does not need to worry about the puerperal osteophyte theory *per se*, because, as his footnote suggests, neither Lloyd, Dean-Jones, nor Lennox was particularly worried about it. Mayhew is content to let William Ogle (and Ogle's cited reference, Karl Rokitansky) serve as a guarantee that in this instance a gender difference that might have seemed to support Aristotle's assumptions of female inferiority was simply a matter of fortuitous pathology. He does not consider the possibility that Ogle's scientific information might be flawed.

Let us return to William Ogle's original note in his commentary. Mayhew's quotation of Ogle's note ends with the sentence, "It must not be forgotten what great difficulty there was in A.'s time in getting a sight of human bones." Mayhew has chosen to omit the last part of Ogle's note, which continues as follows:

Even much later Galen, it is said, went all the way to Egypt for the purpose of seeing merely a bronze representation of

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<sup>17</sup> Von Staden 2002, 125-6.

the human skeleton (*Cuvier, Hist. d. Sc.* i. 59). A well-known story is told of Democritus, how he was in the habit of wandering about among tombs and was therefore supposed by his fellow-citizens to be mad; and how the great Hippocrates was sent to see him, and, having heard his account, pronounced him not only to be sane, but the sanest of men. Cuvier explains this strange habit of Democritus, by supposing that his object was to find “quelques pieces ostéologiques”!<sup>18</sup>

Ogle has supplied two anecdotes—both taken from Cuvier’s *magnum opus*, the posthumously published (1841) five volume, *Histoire des sciences naturelles, depuis leur origine jusqu'à nos jours chez tous les peuples connus professée au Collège de France* [History of the natural sciences among all known peoples from their beginning to the present day presented to the College of France]—to demonstrate the point that scientists in the ancient world had difficult access to human bones. Why would Mayhew leave out the end of Ogle’s note? Surely because this kind of narrative seems out of place in his own argument. Again we are faced with the uneasy positioning of Mayhew’s text somewhere in between the world of the scientist and the world of the classicist. Mayhew needs Ogle to sound like a scientist because Ogle is offering possible scientific proof that Aristotle saw a female skull that appeared to have only one circular suture. In the anecdotes about Galen and Democritus, however, the voice of Ogle as scientist modulates into Ogle as classicist and philologist, i.e., someone who is interested in language and narrative. Indeed, the story about Democritus is more complicated than it might at first seem to be. The main idea is that Democritus’ desire for knowledge about the human body leads him to engage in behavior—wandering around graveyards—that was considered abnormal by his compatriots. Their concern brings a famous physician, Hippocrates, who vouches for the sanity of Democritus. In other words, this is a story with a clear theme; it illustrates science forging ahead against superstition, religious sanctions, cultural taboo, and even well-meaning but uneducated neighbors. Ogle takes this anecdote directly from Cuvier. In Cuvier’s version, the story ends with Hippocrates

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<sup>18</sup> Ogle 1882, 168.

declaring that Democritus is the wisest of men.<sup>19</sup> Ogle has slightly reordered the anecdote so that with the final words the emphasis is now on human bones (“quelques pieces ostéologiques”), and not Democritus. By retaining the original French—which was by no means necessary—he accentuates his punch line effect. Ogle is not writing as a scientist in this passage. He is a self-conscious stylist, not just reporting supporting data, but manipulating his material in the service of his point.

WILLIAM OGLE, TRANSLATOR OF *PARTS OF ANIMALS*

Who was William Ogle, and how did he happen upon Rokitansky’s description of the puerperal osteophyte, which led him to postulate a potential resolution of a perplexing Aristotelian mistake? In the *Dictionary of British Classicists*<sup>20</sup> we learn that Ogle lived from 1827-1912, that he was trained as a doctor but practiced primarily as a teacher of physiology at St. George’s Hospital, and that later he became the Superintendent of Statistics to the Registrar-General, a job he held for some 30 years.<sup>21</sup> In this capacity Ogle showed, like Aristotle himself, a talent for processing large quantities of data. The *Lives of the Fellows of the Royal College of Physicians* describes him as a “weighty contributor” to the *Journal of the Royal Statistical*

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<sup>19</sup> Here is Cuvier’s text: “Démocrite ne fut pas convenablement apprécié par ses compatriots. Errant souvent parmi les tombeaux, probablement pour y chercher quelques pieces ostéologiques, les Abdéritains imaginèrent qu'il avait l'esprit aliéné, et firent venir Hippocrate pour lui donner ses soins; mais ce grand homme ne vit rien moins qu'un fou dans Démocrite, et le déclara le plus sage et le plus savant des hommes,” Cuvier 1970, 103.

<sup>20</sup> Todd 2004, 724-5.

<sup>21</sup> By a strange historical coincidence, a second William Ogle (1824-1905) was practicing medicine in London during this time, also at St. George’s Hospital. Both William Ogles were graduates of Oxford. Interestingly enough, the William Ogle who translated Aristotle was not deemed worthy of an entry in Britain’s *Dictionary of National Biography* (the claim to fame of Virginia Woolf’s father, Sir Leslie Stephen), whereas the other William Ogle, a lecturer in pathology, was. It seems unlikely that the relative merit of their scholarly output was the decisive factor in including one William Ogle but not the other, given that the *Dictionary’s* entry lists only two publications for William Ogle: the “Harveian Oration” of 1880 at the Royal College of Physicians (of which the other William Ogle was also a member—indeed he may have been in the audience) and “a small work,” *On the Relief of Excessive and Dangerous Tympanites by Puncture of the Abdomen* (p. 41).

*Society*.<sup>22</sup> His yearly reports for the Registrar-General included a variety of articles on such topics as vaccination, the increase in the incidence of cancer, and the age of marriage for bachelors in different occupations.<sup>23</sup> Ogle was responsible for a new kind of statistical table classifying causes of death (based on actual cause rather than pathology),<sup>24</sup> which may explain his familiarity with the discoveries of Rokitansky such as the puerperal osteophyte. He was also a botanist, and fluent enough in German to translate *Flowers and their Unbidden Guests* by Anton Kerner. This hobby led to correspondence with two of the most famous natural scientists of his time, the English botanist Joseph Hooker, and Charles Darwin, who wrote the introduction to Ogle's translation of Kerner's book.<sup>25</sup> Reading his obituary notices, one comes away with a sense of William Ogle as the quintessential Victorian gentleman scholar. Here is how the *Times* described the final years of his life:

Of late years Dr. Ogle suffered very severely from osteoarthritis, chiefly affecting the lower limbs and greatly crippling his movements; but as long as he was able to do so he was accustomed to drag himself into the Athenaem Club, and, once seated among friends, had the happy knack of forgetting, or of seeming to forget, sufferings which must often have been severe. Endeared to many, he

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<sup>22</sup> Brown 1955, 155.

<sup>23</sup> See obituary notices in the *London Times* (April 15, 1912) and *Lancet* (April 27, 1912), and the *British Medical Journal* (April 20, 1912).

<sup>24</sup> *Lancet* 1912, 1165.

<sup>25</sup> *London Times*, op. cit. Existing correspondence between William Ogle and Charles Darwin covers the period from March 29, 1867 to April 12, 1882, seven days before Darwin's death on April 19. Summaries of these letters can be found online at <<http://darwin.lib.cam.ac.uk/>>. The subjects are wide-ranging and various. So, for example, in letter 10167 (September, 1875) Ogle asks Darwin whether Aristotle is correct when he observes that bees only visit a single type of flower in any given trip from their hive. In letter 8120 (December, 1871) Darwin sends a letter to Ogle with comments about left and right-handedness. The last two letters date to January, 1882 (letter 13622) in which Darwin thanks Ogle for sending his translation of *Parts of Animals*, and February, 1882 (letter 13697) where Darwin acknowledges having read Ogle's introduction and started the translation itself. "I have rarely read anything which has interested me more; though I have not read as yet more than a quarter of the book proper," he wrote.

never willingly let an old acquaintance drop, and even in his last declining years, when to write a letter was an effort, he kept up his friendships by correspondence.<sup>26</sup>

It is somewhat astonishing that in the midst of such a busy life William Ogle would be able to find time to translate Aristotle's *Parts of Animals*. But it may be that this is how he occupied himself in the years between 1872, when he left his job at St George's Hospital for health reasons (not specified in any of the sources I consulted) and 1880, when he began his work for the Registrar-General's office.<sup>27</sup> Ogle's translation appeared in the first complete English edition of Aristotle's works prepared by J. A. Smith and W. D. Ross for Oxford, and is still in print today. In his preface to the updated *Complete Works of Aristotle* Jonathan Barnes writes, "The translators whom Smith and Ross collected together included the most eminent English Aristotelians of the age; and the translations reached a remarkable standard of scholarship and fidelity to the text."<sup>28</sup> A. L. Peck, who translated *Parts of Animals* for the bilingual Loeb edition, echoes Barnes' assessment of Ogle's work: "Any English translator must stand very much indebted to the work of William Ogle . . . It is not possible to overrate the care and exactness with which this piece of work was executed."<sup>29</sup> Of course, it was not only Ogle's careful translation which distinguished his *Parts of Animals*, it was also the copious notes that accompanied the text, notes influenced and shaped by Ogle's medical and scientific background. Like Mayhew, Ogle is interested in affirming the scientific accuracy (or conversely noting the inaccuracies) of what Aristotle wrote. However because, unlike Mayhew, Ogle's role is that of commentator, his authorial voice retains the stamp of his personal voice. As we have seen in his brief biography, Ogle is well positioned to avoid being caught in that uncomfortable gap that now exists, as noted by von Staden above, between science and classical philology.

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<sup>26</sup> Ibid.

<sup>27</sup> In another striking coincidence, the other William Ogle also left his job at St. George's because of ill health. According to the *Dictionary of National Biography* this William Ogle resigned in 1876 because of depression, but was "cured shortly afterwards by an attack of enteric fever."

<sup>28</sup> Barnes 1984, ix.

<sup>29</sup> Peck 1961, 45.

### KARL ROKITANSKY AND THE PUERPERAL OSTEOPHYTE

But how good is the science of William Ogle? The explanation of Aristotle's mistake concerning cranial sutures in men and women hinges upon Karl Rokitansky and the condition he named "puerperal osteophyte." Karl Rokitansky (1804-1878) is a fitting player in this Aristotelian puzzle, if only because his own life's work proved him to be true to the Aristotelian principle of grounding theory in careful observations of the real world. He was an early pathologist, working at the Vienna Medical School. In her history of the Vienna Medical School in the nineteenth century, Erna Lesky writes that Rokitansky's task was "to arouse German medicine from its natural-philosophical dream and to base it on solid, unchangeable, material facts."<sup>30</sup> Before Rokitansky, physicians approached illnesses through their symptoms.<sup>31</sup> Rokitansky's information, collected from an enormous number of autopsies (30,000 according to one source), allowed him to create a more coherent and systematic picture of various diseases.<sup>32</sup> Lesky describes his accomplishment in this way:

In trying to realize the first point of his program, that of sorting and classifying the pathological disease products, Rokitansky immediately proved himself a born pathological anatomist. With sheer concentration on the senses which characterized his approach, he devoted himself to the visible and perceptible disease products. . . .

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<sup>30</sup> Lesky 1976, 107. Interestingly enough, Erna Lesky provides a serendipitous link between Rokitansky and ancient Greek science, for in addition to her work on the history of medicine in the nineteenth century, she is the editor of Rokitansky's autobiography, and the author of numerous articles on ancient medicine. (Lesky is also the wife of classicist Albin Lesky, who wrote extensively on Greek tragedy.)

<sup>31</sup> Long 1928, 175: "After Rokitansky names of diseases, like pneumonia and typhoid fever, conveyed to the well trained medical graduate an anatomical picture and not as theretofore, a list of symptoms of varying complexity."

<sup>32</sup> Weyers 2004, 432. Weyers notes that while some physicians at that time questioned the value of autopsy, "Nobody did more to disprove those notions than Rokitansky who insisted that case histories be given together with the cadavers, who integrated clinical and pathologic findings, and who thus prepared the ground for the morphologic era in medicine."

On the dissection table an objective picture of the disease emerged from thousands upon thousands of details.<sup>33</sup>

Rokitansky's legacy endures, represented by numerous pathological conditions that bear his name: Mayer-Rokitansky-Küster-Hauser syndrome (women born without a complete vagina), Rokitansky's diverticulum (an outpouching of the esophagus), and Rokitansky-Cushing ulcer (a bleeding problem in the intestines following trauma to the head), to list but three.<sup>34</sup> However, the puerperal osteophyte is not one of these.

What is the puerperal osteophyte, according to Rokitansky? He describes it as a layer of bone of varying thickness growing inside the skulls of women who died while pregnant.<sup>35</sup> Rokitansky was particularly excited about the connection between this abnormal bone growth and pregnancy:

The exudation of bone, which is met with on the inner table of the skull in pregnant women, deserves an especial notice. It is so frequently observed in women under such circumstances, and advances in them to so great an extent, compared with what it reaches in other cases, that some connection between it and pregnancy must be admitted; and as it has been regarded with interest, since the time of its discovery in this institution [the Vienna Medical School], I devote the following paragraphs to an account of it.<sup>36</sup>

Although this growth is usually found on the inside of the skull,<sup>37</sup> it may appear outside the skull as well.<sup>38</sup> Rokitansky never explicitly

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<sup>33</sup> Lesky 1976, 107-8.

<sup>34</sup> See <[www.whonamedit.com/doctor.cfm/981.html](http://www.whonamedit.com/doctor.cfm/981.html)>, which gives a partial list with descriptions.

<sup>35</sup> Rokitansky 1855, 111; 164-6.

<sup>36</sup> *Ibid.*, 164.

<sup>37</sup> *Ibid.*, 164: “Processes of this kind mostly take place on the inner table of the skull, and especially upon and near those spots which are best supplied with vessels; they are, therefore, common along the sinuses and the sutural margins of the bones, and furnish the bone at those parts with a new vitreous table.”

<sup>38</sup> *Ibid.*, 165-6: “When the exudation is more than usually thick and extensive, a similar, but thinner, stratum is found on the outer table of the

says that the puerperal osteophyte causes certain cranial sutures to disappear, nor does he make a specific distinction between the appearance of a skull with a puerperal osteophyte on the inside versus one on the outside. Logically, however, it seems that a bony growth on top of the cranial suture would be more likely to hide the suture from view than a growth below it. And, this external manifestation of the puerperal osteophyte is clearly less common according to Rokitansky, who qualifies the growth in this instance as “more than *usually* thick.” So when William Ogle says that it is not “uncommon” for cranial sutures to become “more or less effaced” in pregnant women he might be pushing the evidence just a little bit. We could also quibble with the fact that Rokitansky describes the puerperal osteophyte as being deposited along the sagittal *and* the coronal sutures, whereas Ogle’s solution to the Aristotelian puzzle requires the disappearance of the sagittal suture only. If the coronal suture is gone, there is no circle.

I will return to this problematic coronal suture presently, but in the meantime it must be noted that present day medicine seems to be entirely ignorant of Rokitansky’s puerperal osteophyte. In modern medical terminology osteophytes are bone spurs that usually form along the joints.<sup>39</sup> A search of the medical databases for any research on puerperal osteophytes of the skull turned up exactly one article written in 1958. Of the nine references in this article’s bibliography, one is to Rokitansky’s manual, four cite the work of A. Hanau (all dated between 1892 and 1894), and the dates of the remaining references are: 1901, 1933, 1935, and 1952. The bulk of the data therefore comes from the nineteenth century when information about the skull and what is inside it would come primarily from autopsies. My, admittedly unscientific, survey of physicians (including an Emergency Room physician, an obstetrician/gynecologist, a pathologist, a surgeon and a professor of anatomy) found no one who had ever heard of the puerperal osteophyte. I do not want to suggest that it has never existed. In fact, Haslhofer’s 1958 article includes two pictures of this condition. But although the puerperal osteophyte may

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skull: at this part, also, as on the inner table, it appears to select the frontal and parietal bones, and *is deposited chiefly along the coronal and sagittal sutures*, and along the part at which the temporal muscle is attached, and the linea semicircularis; it may even be found on the external surface of the bones of the face, especially on the superior maxillary and nasal.” [Emphasis added.]

<sup>39</sup> *Dorland’s Illustrated Medical Dictionary* 2000, 1290.

have been common at one time, it certainly does not appear to be so now. In fact, even as early as 1875, one pathology manual, having described the condition *per Rokitansky*, then asserts, “But the connection of this growth with the puerperal state is very doubtful.”<sup>40</sup> Is it possible that this condition, because it is benign, has simply become irrelevant to modern medicine? Could it have largely disappeared because of environmental changes, or changes in nutrition and management of pregnancy? Given the detail with which science is now able to map out the human body, inside and out, the apparent total disappearance of the puerperal osteophyte is perplexing. Consequently, what was an interesting speculation on Ogle’s part is ultimately a problematic way to account for Aristotle’s mistaken description of human cranial sutures. The puerperal osteophyte theory is at home in Ogle’s commentary, but it sits uncomfortably in Mayhew’s attempt to show an absence of gender bias in Aristotle’s biology.

Moreover, there are several small flaws in Ogle’s reasoning that undermine his speculation from the beginning. The first part of his note on this passage in *Parts of Animals* (not quoted in Mayhew’s excerpt) explains that Aristotle correctly identifies the number of sutures in his account of the male skull as three—the sagittal and the two arms of the lambdoid—because he considers the coronal suture to be part of the bones of the face, not the skull. Logically then, if Aristotle really did see a skull that seemed to have no sagittal suture down the middle, he would not have described it as having a singular circular suture if he counted the coronal suture as belonging to the bones of the face and not the skull. In the absence of a sagittal suture, Aristotle should have described the sutures of this putative female skull as two in number, i.e. the two arms of the lambdoid suture. The fact that Aristotle’s description of the male skull emphasizes the angularity of the lambdoid suture to the extent of counting it as two different sutures also raises the issue that if Aristotle did see a female skull with what looked like a singular circular suture, it would require not only that he consider the coronal suture as belonging to the skull rather than the face in the case of women but not in men—a troubling inconsistency—but also that the two arms of the lambdoid suture must somehow be flattened out enough to no longer look like two separate sutures.

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<sup>40</sup> Jones and Sieveking 1875, 854.

## A FOOTNOTE FUGUE

These problems are of course missing from Mayhew's argument, nor do they seem to have come to the attention of the scholars Mayhew footnotes in support of his position that Ogle's theory of the puerperal osteophyte provides a plausible explanation for Aristotle's mistake concerning human cranial sutures. I now propose a close examination of the references Mayhew cites, some of which come with interesting footnotes of their own. Reading these responses to Aristotle's mistake produces what we might characterize as a footnote *fugue*: the various voices echo each other, sometimes exactly and sometimes with subtle modulations, but always keeping Ogle's commentary as a primary theme.

Mayhew's citation of Lesley Dean-Jones references her book, *Women's Bodies in Classical Greek Science*. Dean-Jones' mention of cranial sutures occurs in her chapter titled "Female Anatomy and Physiology" under the rubric "External Genitalia." (This sounds stranger than it actually is.) The context is a discussion of the Hippocratic position that the vagina and the urethra were two separate organs, contrasted with Aristotle's belief that they were a single organ. Dean-Jones cites a passage from the Hippocratic corpus on the subject of the urethra in men and women whose manuscript tradition is problematic. She then goes on to explain:

If the confusion in the manuscripts is due to a later interpolation, it could be attributed to the influence of Aristotle, because he failed to recognize the separation of the urethra and the vagina. *This is a direct result of one of the founding principles of Aristotle's biology: that the female is a less perfect representative of the human form than the male. The same principle led him to make other erroneous claims.*<sup>41</sup>

Dean-Jones then inserts a brief discussion of the cranial sutures mistake, followed by a similarly brief treatment of Aristotle's declaration that women have fewer teeth than men, before returning to her main topic, namely Aristotle's failure to distinguish between the urethra and the vagina. Here is Dean-Jones' conclusion:

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<sup>41</sup> Dean-Jones 1994, 81 [emphasis added].

[Aristotle's] usually astute readings in contemporary medical literature should also have suggested this anatomical fact to him. Aristotle did not assimilate this knowledge because what would here seem to be a legitimate difference between man and woman, unlike the spurious differences he lists elsewhere, would make a woman superior in some respect by the further specialization of her body to separate her two fluid residues. This is one difference Aristotle simply failed to register because he did not expect it or think of looking for it: it went against one of his most basic tenets.<sup>42</sup>

Skull sutures and teeth presumably fall into the category of “spurious differences,” but Dean-Jones might also be thinking of them as spurious *mistakes*, since in each instance she supplies a plausible explanation: Ogle’s theory of the puerperal osteophyte for cranial sutures,<sup>43</sup> and in the case of dental differences, her suggestion that by sheer coincidence Aristotle just happened to look in the mouths of women who had fewer teeth.<sup>44</sup> By including these particular mistakes—which may, in fact, not have been mistakes—Dean-Jones reinforces her observation of cultural gender bias behind a more significant mistake: Aristotle’s assumption that women could not have had two separate organs (urethra and vagina) when men only had one. In other words, Dean-Jones uses the cranial sutures mistake to throw into higher relief a mistake that, in her opinion *cannot* be easily explained away.

Let us look at exactly how Dean-Jones presents Ogle’s theory as a way to explain Aristotle’s remarks about cranial sutures in humans. Here is the passage in full; I have intercalated Dean-Jones’ footnotes.

[Aristotle] states that a man has more sutures in his skull because he has a bigger brain and a bigger brain needs more ventilation. [Footnote 131: *PA* 653a27-9, 653b1-3.] Men and women have the same number of sutures in their

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<sup>42</sup> *Ibid.*, 83. Mayhew, needless to say, does not include this Aristotelian mistake in his study.

<sup>43</sup> *Ibid.*, 81.

<sup>44</sup> *Ibid.*, 82. Fewer teeth might be explained by the absence of wisdom teeth, for example. Mayhew does include a discussion of teeth in his study, pp. 81-86.

skulls, so it may seem as if here Aristotle is citing completely non-existent evidence as proof of the male's superiority over the female. However at *HA* 491b3-5 he enumerates the sutures as three in a man and one circular one in a woman. Ogle records, "it is by no means uncommon for the sutures on the vertex to become more or less effaced in pregnant women; so common is it, that the name 'puerperal osteophyte' has been given to the condition by Rokitansky." [Footnote 132: Ogle 1882, 168.] In this condition the sagittal suture disappears and the lamboid [*sic*], lateral, and coronal sutures form a circle. Aristotle may have seen or heard of such a skull and, as it was different from a *normal* skull (perhaps seen most commonly on battlefields and therefore easily identified as male), explained its unusual features by saying it was female, even if he did not know for a fact that it was a woman's skull. [Emphasis added.]<sup>45</sup>

There are several things worth noticing in Dean-Jones' version of the cranial sutures problem. First, the quotation from Ogle is fairly opaque until it is explained in the sentence that follows ("In this condition the sagittal suture disappears and the lamboid [*sic*], lateral, and coronal sutures form a circle").<sup>46</sup> If we were to place this passage in Dean-Jones side by side with Ogle's original note we would find that the placement of her footnote citing Ogle is slightly off. Both the anatomical explanation (i.e., the naming of the sutures and the description of the process whereby a circle appears) as well as the reference to finding male skulls on battlefields, properly belong to Ogle. Dean-Jones, rather than choose between quotation and paraphrase—the two options footnoting allows—has used both, but her paraphrase remains outside the footnote, and thus unattributed to Ogle. In the greater scheme of things such a minor slippage is of little importance, but in this case there is a small but significant repercussion that colors the way we read this passage. If Dean-Jones had quoted Ogle in full, as Mayhew does, we would have before us a theory about the circular cranial suture based upon nineteenth-century gynecological pathology. As it stands however, Dean-Jones

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<sup>45</sup> Op. cit.

<sup>46</sup> In the interest of scientific accuracy, it should be noted that there is no cranial suture named "lateral."

has essentially moved the medical explanation into the 20<sup>th</sup> century when those words (“the sagittal suture disappears” etc.) become hers and not William Ogle’s. In so doing she has finessed what, given the scientific advances that separate 19<sup>th</sup> and 20<sup>th</sup> century medicine, is a problematically large body of knowledge.

In addition, Dean-Jones raises the issue of *how* Aristotle knew the skull with only one singular suture had belonged to a woman. Ogle does not directly address this question. Mayhew takes for granted that Aristotle knew it came from a woman who died while pregnant or in childbirth. Dean-Jones, on the other hand, speculates that Aristotle may have simply decided that a skull that was markedly different from all the others he had seen—assuming, with Ogle, that most of these would have been from battle casualties and thus male—would have to be female, as a way to account for that difference. This theory is somewhat compromised by the fact that in the *History of Animals*, in both passages that mention gender difference in cranial sutures (1.7 and 3.7), after claiming that the skulls of women have a single circular suture Aristotle adds that a man’s head has been found with no sutures at all.<sup>47</sup> We do not know how Aristotle knew that this strange skull belonged to a man (unless he is simply taking Herodotus’ word for it), but this piece of evidence weakens Dean-Jones’ suggestion that a skull with an unusual appearance was identified as female *because* of that unusual appearance, and not because Aristotle had managed to get his hands on a female skull. More telling is the adjective Dean-Jones chooses to make her point. Aristotle, she says, may have found a skull that was not “normal” and accounted for this abnormality by labeling it female. By switching the terms of the gender comparison: more (skull sutures and teeth) = superior vs. fewer = inferior, to the opposition of normal and abnormal, Dean-Jones subtly takes us back to her main underlying theme, that for Aristotle, a woman was essentially a mutilated man, a man missing something.<sup>48</sup>

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<sup>47</sup> ἦδη δ' ὁφθη καὶ ἀνδρὸς κεφαλὴ οὐκ ἔχουσα ραφάς. (The skull of a man was also seen before now having no sutures.) Commentators (A. L. Peck for the Loeb edition, e.g.) point out that Herodotus (with his characteristic interest in the wondrous and strange) describes a skull with no sutures having been found on the battlefield of Plataea (*Histories*, 9.83) along with a jawbone with the teeth growing together in a single piece and an extremely tall skeleton. Aristotle may have been thinking about this passage.

<sup>48</sup> Dean-Jones quotes this passage in a later section on reproduction (p. 182). The passage is from Aristotle’s *Generation of Animals*, 737a28: τὸ γὰρ θῆλυ

The text by G. E. R. Lloyd cited in Mayhew's footnote is *Science, Folklore and Ideology*.<sup>49</sup> Lloyd's treatment of the cranial sutures mistake occurs in a paragraph that begins with the following sentence: "The correlations [Aristotle] expects lead him, also, to a number of superficial and some quite inaccurate statements on anatomical points which it should not have been too hard to check."<sup>50</sup> Notice that in spite of the remonstrative tone, Aristotle is not the agent in this sentence. He is the object of the verb, manipulated into error as it were by his expected correlations. Lloyd then names four mistakes: first, the assertion that men have more teeth; next, that they have more cranial sutures; finally Aristotle's claim that males have bigger brains, and, in a footnote to this last point, the "further claim" that males have harder bones. Here is how Lloyd presents the cranial sutures mistake, with his footnotes intercalated, as above:

Again it would not have been impossible for [Aristotle] to have carried out the observations that would have revealed the incorrectness of his assertion that men have more sutures on the skull than women. He represents the latter as having a singular circular suture [Footnote 165: *HA* 491b2ff, 516a18ff. D' A. W. Thompson 1910, notes to *HA* ad loc., suggests that Aristotle may have imagined that the sutures correspond to partings in the hair. Ogle 1882, p. 168 n. 26, notes that "the opportunities of seeing a female skull would be much fewer than of seeing a male skull; for battle-fields would no longer be of service." Compare the account of the different configurations of the sutures in *VC* ch. I, L III 182.1ff, and cf. Galen *UPIX* 17, II 49.26ff H, K III 751.7ff.]—a doctrine that corresponds to the view that males are hotter than females, for the sutures have the function of cooling the brain and providing it with ventilation. [Footnote 166: *PA* 653b2f.]<sup>51</sup>

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ώσπερ ἄρρεν ἔστι πεπηρομένον. (For the female, as it were, is a mutilated male.) The verb I have translated as "mutilated" can specifically indicate castration, but it can also mean to be defective or incapacitated. Dean-Jones translates as "deformed."

<sup>49</sup> Lloyd 1983.

<sup>50</sup> Ibid., 102.

<sup>51</sup> Ibid.

Lloyd assumes that Aristotle should have been able to correct this mistake with more careful observation, although his phrasing implicitly acknowledges that it would have been more difficult than counting teeth. Curiously, his reference to Ogle in his footnote omits any mention of the puerperal osteophyte scenario and notes only Ogle's speculation that Aristotle probably did not see many female skulls. (Few opportunities, we are to understand, is equivalent to, "It would not have been impossible . . .") Lloyd's omission of the puerperal osteophyte suggests that he preferred Thompson's explanation—quoted by Mayhew, but not by Dean-Jones—of why Aristotle would have described the skull's sutures as he did: namely that the sutures follow the pattern of hair partings. Thompson's theory will be addressed in detail presently. For the moment I note what strikes me as problematic in Lloyd's footnote. Certainly it makes intuitive sense to see a central part as corresponding to the sagittal suture, and the hairline going around the head as corresponding to a single 'circular' suture. But if Aristotle were thinking in these terms then that would mean that he believed that women were physiologically incapable of parting their hair in the middle! This seems quite implausible. In fact many Greek female statues dating from the Archaic *kore* figures depict a central hair parting. By introducing a connection between skull sutures and hair Lloyd sidesteps the problem of Aristotle's description of a *gendered* difference in human skull sutures, because the difference is skulls is now a question of where the hair parts naturally, regardless of sex. This move is reinforced by the other references cited in his footnote: the Hippocratic text *Wounds of the Head* ("VC") and Galen's *De Usu Partium*. Neither work—Galen is essentially quoting the earlier Hippocratic text—mentions gender difference, but rather each describes the skull sutures in terms of various Greek letters (*tau*, *eta*, and *chi*), depending upon the shape of the head.

Aside from Thompson, Mayhew's final reference in his footnote is to the translation and commentary on *Parts of Animals* by James Lennox.<sup>52</sup> Checking the passage in question we find that like Ogle, Lennox feels that Aristotle's remark that the skulls of men have more cranial sutures than those of women calls for some additional information. He writes:

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<sup>52</sup> Lennox 2001.

The differences between the sutures of male and female humans, and between humans and other animals, are repeatedly discussed in *History of Animals*. These claims are false, but their specificity argues for their being based on some sort of observation (for a speculation, see Ogle 1882: 168 n. 26; 1912: 653b1 nn. 3, 4). None the less, it has been argued that Aristotle's theory of the cooling function of the sutures may have led to the uncritical adoption of such claims (Lloyd 1983: 102 and nn. 165-7; 1989a: 57).<sup>53</sup>

As we might expect in a commentary, Lennox begins by pointing out that Aristotle also talks about gender difference in cranial sutures in a second text, i.e., *History of Animals*. It is in this text, we recall, that Aristotle specifically mentions a singular suture in human female skulls. As for the puerperal osteophyte theory behind the circular suture, Lennox's note qualifies Ogle's hypothesis as a "speculation" and omits the medical particulars, preferring instead to insist upon the fact that the details (i.e., a single *circular* suture vs. three that meet at a point) imply that Aristotle is basing his observation upon something he (or someone else) saw. In other words, he indicates that an ideologically driven description might have simply noted fewer sutures in women's skulls, but not necessarily a single circular one.

However, Lennox is clearly not satisfied that Aristotle has been completely exonerated of ideological bias, so he adds, "it has been argued" that Aristotle's point about the circular suture is driven by a theory—that the function of cranial sutures is to cool the brain—and is thus an "uncritical adoption" of the claim that female human skulls have fewer sutures. Note that here Lennox is carefully suggesting that Aristotle probably did not see such a skull himself, but was told about it by another observer, and accepted this observation as factual because it cohered with his idea about the function of cranial sutures. Support for this proposition is provided by a reference to Lloyd's text, which we have just examined. Interestingly, Lennox avoids any mention of gender at this point, and the cooling function theory is not, in and of itself, an example of Aristotelian gender bias. The bias comes into play only when coupled with Aristotle's assumption that men's brains need more cooling (and thus more sutures) because they are bigger and hotter than women's brains. The problem of misogynistic preconception on the part of Aristotle, while not

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<sup>53</sup> Ibid., 209-10.

eliminated completely, has been very subtly sanitized in Lennox's note, having been recast as an issue of a mistaken theory about the function of cranial sutures, with gender difference left implicitly in the background.

#### RECAPPING

Reviewing Mayhew's cited sources in terms of narrative choices, here is what we have found. He has truncated Ogle's note to emphasize both the probable scarcity of female skulls available to Aristotle for observation, and Rokitansky's puerperal osteophyte condition, which could explain the appearance of a circular suture in female skulls. Mayhew leaves out Ogle's reminder at the beginning of his note that for Aristotle the coronal suture belongs to the bones of the face, and thus does not confront the problem that his male skull, with its three sutures, does not count the coronal suture, whereas the female skull, with its circular suture, does. He also leaves out—as one would expect him to—the final part of Ogle's note in which Ogle presents us (courtesy of Cuvier) with two anecdotes from antiquity illustrating the point that access to information about the inside of the human body was difficult at best for ancient scientists. This information is not necessary for Mayhew's argument. Indeed restoring Ogle's note in full reveals, as we have seen, a very different kind of discourse, one that if reproduced in Mayhew's citation would be in direct competition with the scientific discourse characterizing the beginning of the note. It is precisely because they represent a different kind of discourse that Ogle's stories about Galen and Democritus have the potential to destabilize the scientific edifice that Mayhew is in the process of constructing.

Supporting this edifice is a footnote that references Lesley Dean-Jones, G. E. R. Lloyd, and James Lennox. The presence of Dean-Jones in Mayhew's note is a powerful reminder of the ability of the footnote to subsume the individual voice in the service of consensus. Although Dean-Jones uses Ogle's note in a way that is quite similar to Mayhew's, she and Mayhew are in fact operating with *opposing* agendas. Whereas Mayhew wants to assert a minimum of gender bias in Aristotle's biological writings, Dean-Jones insists upon it. In her text the cranial sutures mistake serves as a reminder that in spite of the fact that Aristotle's scientific accuracy may be greater than he is given credit for, this accuracy cannot efface his mistaken notion that woman was essentially an inferior version of man. Unlike Dean-

Jones, Lloyd and Lennox both avoid the details of Ogle's puerperal osteophyte theory—for Lennox, we recall, it is a “speculation,” and Lloyd does not mention it at all—and both take on the problem of gender bias in a rather oblique way, carefully subordinating the cranial sutures mistake to a larger theoretical picture that includes the function of cranial sutures. Technically then, neither offers strong support for Mayhew's argument, although there is no way to know that; their presence at the bottom of the page is sufficient for his purposes.

#### CODA. CRANIAL SUTURES AND HAIR PARTINGS

D'Arcy W. Thompson's 1910 translation and commentary of *History of Animals* was included—along with Ogle's translation of *Parts of Animals*—in the Oxford edition of the complete works of Aristotle.<sup>54</sup> Unsurprisingly Thompson found the two references in *History of Animals* to women having a single circular cranial suture (vs. three sutures for men) both worthy of comment. His note on 1.7, quoted in Mayhew's footnote, reads:

CF. *H.A.* [*History of Animals*] iii.7.516a19 [Book 3, chapter 7] (and note), *P.A.* [*Parts of Animals*] 11.10.656b14. I imagine that this singular misstatement dates from a belief that the sutures of the skull coincided with the margin and the partings of the hairy scalp.<sup>55</sup>

Thompson's later note on Aristotle's repeated mention of gender difference in skull sutures at 3.7 observes the following:

The alleged difference between the male and female skull is one of the puzzles of Aristotelian anatomy; I am inclined to think (with Harduin, *ad Plin. xi.* 48) that A. imagined the sutures to correspond with the partings of the hair, but see Ogle's note (*Parts of Anim.* P. 168).<sup>56</sup>

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<sup>54</sup> Completed in 1954 under the editorial direction of J. A. Smith and W. D. Ross. The entire collection was revised under the editorship of Jonathan Barnes, published in 1984.

<sup>55</sup> Thompson 1910 (pages not numbered).

<sup>56</sup> *Ibid.*

A connection between cranial sutures and the hair on the head does make sense from Aristotle's point of view. Here is how he describes it in *Parts of Animals*, in William Ogle's translation:

No animal has so much hair on the head as man. This in the first place is the necessary result of the fluid character of his brain, and of the presence of so many sutures in his skull. For wherever there is the most fluid and the most heat, there must necessarily occur the greatest outgrowth.<sup>57</sup>

Thompson must be inferring that if the sutures allow the fluid of the brain to escape, that is where we would find hair growth demarcated. However, as I have noted above, is a strange way to account for a *gendered* difference in human skulls. Aristotle does not discuss gender differentiation in the pattern of hair growth in humans. Can Pliny, whom Thompson credits (via Harduin) as responsible for this idea, resolve the dilemma?

Pliny the Elder was a Roman scholar (he died during the eruption of Mt. Vesuvius in 79 CE) very much in the Aristotelian mold, inasmuch as he was a prodigious collector and sorter of information of all types. The scale of his coverage as well as the assortment of facts is astonishing.<sup>58</sup> The primary subject announced for Book XI, where we find the passage referenced by Thompson, is “types of insects,” which seems at the outset to be an extremely odd place to find information about human cranial sutures. However the particular subject discussed in Chapter 48 belongs to a section where Pliny gives an account of the nature of all animals by taking each organ or part separately, the skull being one of those parts. Here is the full text of Chapter 48, in Rackham's Loeb translation, with the relevant sentence underlined and accompanied by Pliny's own words in Latin:

In human beings only a double-crowned skull occurs in some cases. The bones of the human skull are flat and thin and have no marrow; they are constructed with interlockings serrated like the teeth of a comb [*Capitis ossa plana, tenuis, sine medullis, serratis pectinatin strcta compagibus.*]

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<sup>57</sup> Ogle 1882, 49.

<sup>58</sup> Book 1, which contains the table of contents for the remaining 36 books as well as Pliny's sources, takes up 143 pages in the Loeb translation. Rackham, 1938.

When broken they cannot form again, but the removal of a moderate piece is not fatal, as its place is taken by a scar of flesh. The skull of the bear is the weakest and that of the parrot the hardest, as we have stated in the proper place.<sup>59</sup>

The closest thing to “partings of the hairy scalp” in this passage is the adverb *pectinatim*, “like a comb” (from the Latin noun for “comb,” *pectin*), which describes the appearance of the skull sutures, not their location. (Pliny does go on to discuss hair in a later chapter.)

Thompson gives credit to Harduin for the hair partings theory, so the error may have originated in Harduin’s reading of Pliny. Who was Harduin? Jean Hardouin<sup>60</sup> was a French scholar (1649-1729) who edited an edition of Pliny’s *Natural History*.<sup>61</sup> Hardouin’s editorial comment on the passage cited above (where Pliny says that the bones of the skull are *serratis pectinatim*, serrated like a comb) addresses the word “serrated.” He writes: *Suturas intellegit; in mulieribus una est in orbem; in viris, ternae* [He (Pliny) means sutures; in women there is a single one in a circle; in men there are three]. In other words, Hardouin glosses the Pliny passage—where there is no mention of either hair or gender difference—with a reference to what Aristotle says about gender difference in cranial sutures in *History of Animals* (1.7 and 3.7), a passage where there is also no mention of hair. Thompson’s idea, which makes sense from the Aristotelian perspective of the relationship between hair and skull sutures, makes no sense from the perspective of gender difference in skull sutures. And Thompson’s supporting footnote, which directs us to Hardouin and his primary source, Pliny, gets us no closer to hair partings than the mention of the teeth of a comb.

## CONCLUSION

Commentary, to paraphrase Christina Kraus, takes as its starting point the “disorder” created by a problem in a primary text

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<sup>59</sup> Ibid., 515.

<sup>60</sup> Thompson’s misspelling of his name is explained by the fact that in Hardouin’s edition of Pliny his name would have appeared on the title page in a Latinate version, without the “o.”

<sup>61</sup> The edition I consulted, from the library of the Merkelbeek Carmelite Monastery, was published from 1829-1834 with, in addition to Hardouin’s notes, those of (unnamed) more recent scholars (*et recentiorum adnotationibus*).

and then imposes order in an explanatory “meta-narrative.”<sup>62</sup> Ogle’s note on Aristotle’s mistaken observation that men have three cranial sutures while women have only one demonstrates this principle beautifully. Ogle gives us a scenario that explains circumstances under which Aristotle might have legitimately made this false claim. Mayhew takes this meta-narrative and places it in the service of an argument, namely that Aristotle was not, in the case of cranial sutures, simply making a claim that reflected the gender bias of his time and place. This process produces a footnote referencing other Aristotelian scholars, all of whom mention Ogle in one way or another. By letting these secondary texts speak fully in their own voices, I have essentially offered a commentary of Mayhew’s footnote, generating a new meta-narrative. Kraus described the meta-narrative of commentary as corresponding to a potential *mise en abyme*. The meta-narrative of my commentary, on the other hand, inscribes a different path corresponding—although perhaps in a different way—to the “ludic” principle mentioned by Kraus. Rather than a progression of infinite regression it creates an ever-expanding web of connections in an outward spiral. Anthony Grafton, at the end of *The Footnote*, uses similar imagery, evoking the weaving of Homer’s Penelope:

Wise historians know that their craft resembles Penelope’s art of weaving: footnotes and text will come together again and again, in ever-changing combinations of patterns and colors. Stability is not to be reached. Nonetheless, the culturally contingent and eminently fallible footnote offers the only guarantee we have that statements about the past derive from identifiable sources. And that is the only ground we have to trust them.<sup>63</sup>

In other words, the puerperal osteophyte may have disappeared from the medical world, but Rokitansky and his observations will always have a place in the history of Aristotelian scholarship. Similarly, Hardouin may not have been responsible for a theory that successfully brought together gender difference in cranial sutures and the partings of the hair, but he nevertheless will always remain a member of our scholarly community. He is, in the words of Grafton, an “identifiable source.” To that extent, Thompson’s note citing

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<sup>62</sup> Kraus 2002, 9, quoted in the introductory section of this essay.

<sup>63</sup> Grafton 1997, 233.

Hardouin is indeed trustworthy. But Hardouin may not be. He has the dubious honor of having proposed a theory that most surviving texts from antiquity (Pliny's *Natural History* was of course an exception) were not authentic, as we learn from one of his contemporaries, Johann Burkhard Mencken (1674-1732), in a lecture series titled, "The Charlatanry of the Learned":

So far I have spoken only of authors who are dead, and I hesitate to speak of one still alive—one who is today a light of learning in France, the Jesuit Jean Hardouin. He has already published a number of works worthy of remembrance, one alone of which, his "Pliny," is sufficient to immortalize him. But whether to amuse himself or, as some think, to attract attention to his society, he has attempted to establish the principle that the majority of the works that have come down to us from ancient times, ecclesiastical as well as secular, were produced, or at least altered, by a confederation of forgers. When pressed to give his reasons for this strange idea, he replies that as long as he lives God alone will know them, but that after he is dead they will be found on a piece of paper no larger than his hand. What an answer! I leave it to you to judge what it is worth.<sup>64</sup>

In the matrix that is the footnote, the web of connections has the potential to be endless, and it is our job to judge what they are worth.

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<sup>64</sup> Mencken 1937, 82-3.

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