

“ACROMION” IN ANCIENT GREEK MEDICAL WRITERS

by

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“Acromion” is one of many anatomical terms derived from ancient Greek: it is a transliteration of the Greek word ἀκρόμιον (*akrōmion*). For the modern anatomist “acromion” has a precise meaning: “The lateral extension of the spine of the scapula, forming the highest point of the shoulder.”¹ For the ancient Greek writers after Hippocrates, however, the meaning of ἀκρόμιον was a matter of doubt and dispute. The dispute was not merely a linguistic one, but arose from ignorance of the exact structure of the bones within the shoulder area, and particularly of the joint between the scapula and clavicle.

From the ancient sources down to and including Galen it is clear that the human shoulder had never been dissected. The ancient knowledge of it was derived principally from external examination, supplemented by a study of shoulder injuries. It is worth noting here what an examination by palpation reveals. The clavicle can be followed along its entire length, starting from the medial end and ending near the tip of the shoulder. The spine of the scapula can also be followed up its whole length to near the tip of the shoulder. Here the two bones merge to form a single wider whole which extends right to the tip; but it is impossible to tell from palpation exactly where or how the joint is made. This uncertainty underlies the meaning and usage of ἀκρόμιον in ancient Greek.

The word itself is derived from ὄμος (*ōmos*) = “shoulder” + an adjective ἄκρος (*akros*) whose root means “end, tip, point”. Its earliest appearance is in the Hippocratic corpus (fifth to fourth centuries B.C.).² It occurs principally in the treatise *On joints* with reference to the tip of the shoulder, which is distinguished from the shoulder area as a whole (ὄμος) and the area on top of the shoulder (ἐπωμία). *On joints* contains a set of instructions for reducing a dislocated shoulder which depicts the surgeon as “. . . thrusting his head against the tip of the shoulder [ἀκρόμιον] to provide a point of resistance . . .”³

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¹ L. R. C. Agnew *et al.*, (editors), *Dorland's illustrated medical dictionary*, Philadelphia, W. B. Saunders, 1965, s.v. ‘acromion’.

² Neither the corpus nor any of the works it contains can be exactly dated. “. . . It is probable . . . that the writings came to Alexandria as the remnants of medical literature which had circulated in the fourth and fifth centuries . . .” (L. Edelstein, ‘Hippocrates’, in N. G. L. Hammond and H. H. Scullard (editors), *The Oxford classical dictionary*, Oxford, Clarendon Press, 1970, p. 518).

³ Chapter II: the text is that of the Loeb edition (W. H. S. Jones and E. T. Withington (editors), *Hippocrates*, London, Heinemann, 1962, 1967, 1968), vol. III, p. 202, 11. 10–11. All translations in this article are my own unless otherwise indicated.

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Again, describing the appearance of the shoulder when the humerus has been dislocated into the armpit the author writes: “. . . The bone in the tip of the shoulder [τὸ τοῦ ἀκρώμιον ὀστέον]⁴ sticks out visibly, because the joint has slipped down into the lower part of the area . . .”⁵

Here the phrase “the bone in the tip of the shoulder (ἀκρώμιον)” shows that the word ἀκρώμιον (*akrōmion*) refers, not specifically to that bone, but generally to the area in which it is situated.

The most important passage of *On joints* in which the word occurs is the following: “When the ἀκρώμιον is wrenched out of position the bone so wrenched makes an obvious protuberance—this is the bond between the clavicle and the scapula, for man’s structure here differs from that of the other animals. . . .”⁶

By the rules of Greek grammar the word “this” refers back to the nearest appropriate entity, here “bone”, and (as before) ἀκρώμιον (*akrōmion*) refers to the area in which that bone is situated: the author is saying that the bone in the tip of the shoulder, which causes a protuberance in this injury, is the bone which forms the bond (σύνδεσμος: *syndesmos*) between the clavicle and scapula. This passage seems to be the earliest witness to the tradition of a third bone involved in this joint, a tradition to which, as we shall see, Galen himself subscribed.

Modern anatomists know that this third bone is an integral part of the scapula, now called the acromion. The view implied in *On joints*⁷ that it is a separate bone is not so much a mistake as a guess founded on ignorance of the true structure of the joint.⁸ The injury described there reveals that the bone in the tip of the shoulder is not part of the clavicle, and the author, or the tradition he is following, has concluded that it is not part of the scapula either. Only dissection could disprove this conjecture, and the fact that it had still not been carried out in the time of Galen is an indirect tribute to the authority of the Hippocratic corpus.

The existence of a third bone in the acromio-clavicular joint is implied also by Aristotle (384–322 B.C.). In the course of a rapid survey of the skeleton he writes: “. . . And furthermore there are the bones in the shoulders, and those called ‘shoulder-blades’, and those of the arms, which are connected with these, and with these those in the hands . . .”⁹. The distinction made here between “the bones in the shoulders” and “the shoulder-blades” becomes intelligible only when we realize that Aristotle is following the Hippocratic tradition that the bone in the tip of the shoulder is separate from the scapula.¹⁰

⁴ The phrase τὸ ἀκρώμιον ὀστέον [*sic*] which appears in the article on ‘acromion’ in H. A. Skinner, *The origin of medical terms*, New York, Hafner, 1970, p. 7, seems to be a mistake for this.

⁵ Chapter X: op. cit., note 3 above, p. 222, 11. 22-24.

⁶ Chapter XIII: op. cit., note 3 above, pp. 230–231, 11. 1–5.

⁷ *Ibid.*

⁸ The acromion ossifies from its own centres and occasionally fails to unite completely with the scapula. But if the ancient anatomists had been aware of either of these facts they must also have known that the acromion is normally an integral part of the scapula.

⁹ *Historia animalium* 516a 32ff. I have followed the text of the Loeb edition.

¹⁰ The two principal modern English versions of *Historia animalium* take the passage differently: (a) D’A. W. Thompson, *Historia animalium*, in *The works of Aristotle*, Oxford, Clarendon Press, 1910, vol. IV (pages not numbered): “Then come the shoulder-bones, or blade-bones, and the arm-bones connected with these, and the bones in the hands connected with the bones of the arms.”

(b) A. L. Peck, *Aristotle, historia animalium* (Loeb Classical Library), London, Heinemann, 1965,

Rufus of Ephesus (fl. A.D. 98–117) defines the word ἀκρόμιον (*akrōmion*) as follows: “. . . ἀκρόμιον refers to the bond [σύνδεσμος] between the clavicle and the scapula. Eudemus says that the ἀκρόμιον is a small bone”¹¹ It thus appears that Eudemus, like his teacher Aristotle, accepted the tradition of a third bone linking clavicle and scapula. But it is the first sentence here that is particularly noteworthy. It echoes almost verbatim a sentence of *On joints* quoted above,¹² but, with a remarkable variation, it takes the τοῦτο (“this”) as referring, not to ὀστέον (“bone”), but to ἀκρόμιον (*akrōmion*).

This ancient interpretation of the Hippocratic passage must, I think, be rejected. Not only does it ignore the natural grammatical reference of τοῦτο, but it invests ἀκρόμιον with a meaning which it does not otherwise possess in the Hippocratic corpus. The word appears six other times in *On joints*¹³ and the meaning is consistently “the tip of the shoulder”. As the same meaning makes good sense in the passage quoted¹⁴ there must be very persuasive reasons for rejecting the consistent usage therein. Such reasons are not, I think, forthcoming.

The reason why Rufus interpreted the sentence in this way was that he regarded it as impossible for a bone to be a σύνδεσμος (*syndesmos*). The word σύνδεσμος is formed from the verb συνδεῖν (*syndein*) = “to bind together” and means “a binding” or “that which binds”. In ancient Greek anything which binds two or more things together may be described as a σύνδεσμος, whether it be a wooden framework reinforcing a brick wall¹⁵ or a grammatical conjunction.¹⁶ The sinews which bind together the bones of a joint are a σύνδεσμος, as Julius Pollux points out for the benefit of the emperor Commodus: “. . . Sinews [νεῦρα: *neura*] are the binding of bones [σύνδεσμος ὀστέων], both loose and tight”¹⁷

This statement is reminiscent of, and perhaps based on, another sentence from *On joints*, where the author is suggesting reasons why some dislocations are easier to reduce than others: “. . . There is the greatest difference in the binding provided by the

p. 193: “Further, there are the bones of the shoulder—what are called the shoulder-blades, and the bones of the arms, which are connected with them, and in their turn, connected with these, the bones in the hands.”

Both these versions take αἱ καλούμεναι ὁμοπλάται (“what are called the shoulder-blades”) as explanatory of, and in apposition to, τὰ ἐν τοῖς ὤμοις ὀστέα (“the bones in the shoulders”); but this fails to do justice to the τε . . . καὶ construction, which links the two phrases and indicates that the shoulder-blades are in addition to the bones in the shoulder. There remains the problem why, if my interpretation is correct, Aristotle did not follow the Hippocratic phraseology and refer to τὰ ἐν τοῖς ἀκρωμίοις ὀστέα rather than τὰ ἐν τοῖς ὤμοις ὀστέα. The answer is that Aristotle seems to have deliberately avoided the word ἀκρόμιον, which occurs only once in the whole Aristotelian corpus (at *Historia animalium* 606a 16, where a change of accentuation from ἀκρωμίων to ἀκρωμιῶν would make the form feminine and bring it into line with three other Aristotelian instances of the feminine: see note 36 below). The following καὶ αἱ καλούμεναι ὁμοπλάται, differentiating “the bones in the shoulders” from “the shoulder-blades” makes the reference of τὰ ἐν τοῖς ὤμοις ὀστέα sufficiently clear.

¹¹ *On the names of the parts of the body*, 72–73.

¹² *Op. cit.*, note 6 above.

¹³ In chapters II, III, X, XIII, XVI and XLIII; *op. cit.*, note 3 above, p. 202 l. 11, p. 206 l. 28, p. 222 l. 22, p. 234 l. 34, p. 244 l. 27, p. 284 l. 4.

¹⁴ *Op. cit.*, note 6 above.

¹⁵ Thucydides II, 75, 4–5.

¹⁶ Aristotle, *Rhetorica* 1407a 20.

¹⁷ *Onomasticon* II 234.

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sinews [τῶν νεύρων ὁ σύνδεσμος], which in some cases is slack and in others is stretched tight”¹⁸ By a natural transition these sinews came to be called σύνδεσμοι (*syndesmoi*: “ligaments”), a usage found already in the Hippocratic corpus.¹⁹ Galen (A.D. 129–?199) uses the word very frequently in this specialized meaning, in both singular and plural. After referring to the movements of the head he remarks: “. . . Such movements are impossible without a joint [διάρθρωσις: *diarthrosis*], ligaments [σύνδεσμοι] and muscles”²⁰

In the next chapter he treats at some length of the ligaments and their functions, stating at one point that “. . . if the articulating bones were not strengthened by the ligaments [διὰ τῶν συνδέσμων] nothing would prevent them from departing from their proper seat to one side or the other at every movement”²¹ A little later he adds: “. . . For you will see that every ligament [πάντα σύνδεσμον] is tough enough to bind together [συνδέειν] the bones securely without preventing their being moved, and soft enough not to be readily crushed or broken off”²²

And finally, after distinguishing between nerve (νεῦρον), ligament (σύνδεσμος) and cartilage (χόνδρος), he writes: “. . . Nature wonderfully uses each one in all the parts of the animal, never putting nerve or ligament in the place of cartilage, nor cartilage or nerve in the place of ligament, nor ligament or cartilage in the place of nerve.”²³

Now, Rufus lived only some sixty years before the time of Galen,²⁴ and for him (especially in a medical context) “ligament” would be the most familiar meaning of σύνδεσμος. That was apparently how he took it in the passage of *On joints*²⁵ which he was using as his source and, unable to make any sense of the statement “this bone is the ligament between clavicle and scapula”, he referred “this” instead to ἀκρώμιον

¹⁸ Chapter VIII: op. cit., note 3 above, p. 214, ll. 5–7. A sentence in *On the art X* (op. cit., note 3 above, vol. II, p. 208, ll. 23–27) uses somewhat similar language: “. . . There are in addition to these many blood-vessels and sinews which do not lie suspended in the midst of flesh but are stretched along close to the bones, a binding of the joints to a certain point, and the joints themselves, in which the ends of the movable bones turn” The phrase “a binding of the joints to a certain point” (σύνδεσμος ἐξ τι τῶν ἄρθρων) is puzzling. Grammatically it seems to be in apposition to, and explanatory of, νεῦρα, defining the sinews as “the binding of the joints” as in the other passages quoted; but what of ἐξ τι = “to a certain point”? The ligaments do not bind the joint to anything: they merely bind the two parts of it together. The phrase might also be translated “to a certain extent” or “up to a point” (and this seems to be how Littré takes it); but this seems equally void of meaning. I suggest that the reading should be, not ἐξ τι, but the verb ἐστί. The clause σύνδεσμός ἐστι τῶν ἄρθρων is then an explanatory addition in parentheses either by the author or from a marginal gloss because the passage recalled *On joints VIII*. The version of W. H. S. Jones in the Loeb Classical Library (op. cit., note 3 above, vol. II, p. 209) is literal: “. . . binding the joints to a certain point”; that of J. Chadwick and W. N. Mann (*The medical works of Hippocrates*, Oxford, Blackwell, 1950, p. 87) is a paraphrase whose connexion with the Greek text is not always clear: “. . . There are in addition many blood-vessels and nerves which do not lie loose among the muscles but are attached to the bones and ligaments which form the joints”

¹⁹ E.g. *On joints XLVI*: op. cit., note 3 above, p. 292, l. 17.

²⁰ *De usu partium XII 1*: G. Helmreich (editor), *Galen de usu partium libri XVII*, Amsterdam, Hakert, 1968, vol. II, p. 182, ll. 14–15.

²¹ *Ibid.*, p. 183, ll. 11–13.

²² *Ibid.*, p. 184, ll. 5–8.

²³ *Ibid.*, p. 185, ll. 12–16.

²⁴ Rufus was active in the reign of the emperor Trajan (A.D. 98–117) and Galen was court physician to the emperor Marcus Aurelius (A.D. 161–180). See the entries on Rufus and Galen in *The Oxford classical dictionary*.

²⁵ Op. cit., note 6 above.

and so obtained the definition “the ἀκρόμιον is the ligament between clavicle and scapula”, adding that “Eudemus says that the ἀκρόμιον is [not a ligament but] a small bone.”

The author of *On joints*, however, had intended the word in its earlier, non-specialized, meaning, implying merely that the third bone in the shoulder helps to bind together the clavicle and scapula. That this is how Galen understood the passage is apparent from his description of the clavicle in *De usu partium*: “. . . Here a small cartilaginous bone binds [συνδέει] it to the spine of the scapula. This bone is not found in apes; in this, as in other respects, their structure is inferior to the human. But in fact man, for the sake of safety, has this additional feature, that it is not merely through membranous ligaments [διὰ συνδέσμων . . . ὑμενωδῶν] that the two ends of the bones are joined, but for good measure a third bone, which is cartilaginous and lies upon them, joins itself to the bones beneath by certain strong ligaments [συνδέσμοις] which conceal it . . .”²⁶

The use at the beginning of this passage of the verb συνδέει (*syndei*), from which σύνδεσμος (*syndesmos*) is derived, is notable; Galen is deliberately recalling the Hippocratic term. The passage is the nearest approach in extant literature to a description of the third bone; the vagueness of the terms used reflects the ancient ignorance of the real structure of the area.²⁷ The reason why the word ἀκρόμιον is not used in this passage will appear presently.

Hence a word which was at first a general designation for the tip of the shoulder was later, by a misapprehension, applied to the ligament(s) binding clavicle to scapula. On the testimony of Galen we may now add a third meaning. In his treatise *On bones: for beginners* he writes (in the course of a description of the scapula): “. . . Starting thence low on the spine it gradually increases in size, extending upwards as far as the area at the ἀκρόμιον. At this point the clavicle is attached to it. Some anatomists apply the term ἀκρόμιον to the actual joint [σύνταξις]; others say that, besides the two bones which come together here there is a third bone, found only in man, which they call both κατακλείς [*katakleis*] and ἀκρόμιον . . .”²⁸

At its third appearance in this passage ἀκρόμιον is cited as a technical name for the third bone supposed to be involved in the joint between clavicle and scapula.²⁹

²⁶ XIII 11: *op. cit.*, note 20 above, p. 274, 11. 24ff.

²⁷ Contrast Galen's firm statement that “this bone is not found in apes”, a fact which had been revealed by dissection. The contrast reveals clearly that the human shoulder had never been dissected. Galen's evidence that the human structure was different from that of the ape here was the Hippocratic assertion (*op. cit.*, note 6 above) that “man's structure here differs from that of the other animals”, which would not be disproved until the human shoulder was dissected.

²⁸ Chapter XIV: C. G. Kühn (editor), *Galenī opera omnia*, Lipsiae, Cnobloch, 1821–1833, vol. II, p. 766. For the phrase “found only in man” compare the previous note. The first time ἀκρόμιον appears in this passage it has its Hippocratic meaning “tip of the shoulder”; the second appearance is open to some doubt textually, the word being followed in Kühn's text by ἀρμυρίαν which I have omitted in my version (as does Kühn in his Latin version). It is to be observed that Galen has in this passage replaced Rufus's σύνδεσμος (*op. cit.*, note 11 above) by the more neutral σύνταξις (*syntaxis*), a favourite word of his to denote any sort of joint between bones. The classical meaning of σύνταξις is “arrangement”; the meaning “joint” (which Liddell and Scott's *Greek-English Lexicon* ignores) appears in such passages as *De usu partium* IX 18 (*op. cit.*, note 20 above, p. 53, 11. 8–10): “. . . Furthermore, the joints [συντάξεις] of the bones at the temple are also sutures . . .”

²⁹ The evidence of Galen suggests that the word had only recently begun to be used in this way, and there are no earlier instances. The statement of Rufus of Ephesus (*op. cit.*, note 11 above) concerning

Galen ascribes this use of both κατακλείς and ἀκρόμιον to “others”. Certainly he did not so use either of them himself. Ἀκρόμιον appears four times in *De usu partium*, the first of which is part of his description of the scapula: “. . . Furthermore, nature neatly used the spine [i.e. of the scapula] over again for another purpose. Having gradually enlarged the upper end of it, stretched it straight up, and joined it at that point to the clavicle, she created the so-called ἀκρόμιον to be a covering and protection for the joint at the shoulder, to prevent the head of the humerus from dislocating upwards, and to keep the scapula at a distance from the rib cage”³⁰

Here Galen lists three functions which the ἀκρόμιον performs; he expresses them by means of three future participles,³¹ representing them as the purposes of nature in so structuring the area. The list proves that by ἀκρόμιον he is referring to the bony area which can be felt in the tip of the shoulder: it is this which covers and protects the shoulder joint, which prevents the head of the humerus from dislocating upwards, and which, by affording the clavicle something to push against, keeps the scapula at a distance from the rib cage. But the first part of the extract implies that the ἀκρόμιον (in this sense) is part of the scapula: the participles “having enlarged” etc. could well be translated “by enlarging, by stretching, by joining”. Hence it appears that Galen is not using the word as a technical name for the detached third bone (whose existence he elsewhere recognizes: see note 26), but to designate the bony area which can be felt at the tip of the shoulder *whether or not this is part of the scapula*. The third bone is a structural matter, whereas here he is concentrating entirely on function. But in the passage describing the structure of the joint between clavicle and scapula³² he eschews the word ἀκρόμιον because its use would evade the issue.

Eudemus might suggest that Eudemus so used it; but the interpretation of that passage which I offered above takes the word in a more general sense. There is a passage in the Hippocratic treatise *Instruments of reduction* (chapter I: op. cit., note 3 above, p. 400, 11. 52–3) which reads: “. . . the ἀκρόμιον comes from the shoulder-blades, but differently from the majority” For “differently from the majority” compare note 27 above. The passage means that the tip of the shoulder (ἀκρόμιον) is formed by the scapula; and the difference from the majority is that in fact it is formed with the help of a separate bone. There is therefore no need to regard ἀκρόμιον in this passage as a specific reference to that bone, for it has simply its usual Hippocratic meaning.

³⁰ XIII 10: op. cit., note 20 above, p. 270, 11. 7ff. My translation of the last clause (εὐθὺς δὲ καὶ τὴν ὀμοπλάτην αὐτὴν ἀφροστηκυῖαν τοῦ θώρακος φυλάξον) differs somewhat from that of Mrs. M. T. May (*Galen on the usefulness of the parts of the body*, New York, Cornell University Press, 1968, vol. II, p. 609). Her version reads: “. . . and [to] keep the scapula itself from separating forthwith from the thorax” But this misrepresents the tense of ἀφροστηκυῖαν, which is perfect with present meaning and indicates that the scapula *is already* so separated; and in fact in the next sentence but one Galen points out that the scapula must stand away from the rib cage or the shoulder joint would be hopelessly cramped: “. . . If the clavicle were not attached at this point, nothing would prevent the whole scapula, being unsupported, from falling upon the thorax, cramping the shoulder joint there and impeding many of the movements of the humerus” (tr. May). For εὐθὺς see the next note.

³¹ The three participial phrases are introduced respectively by ἅμα μὲν, ἅμα δὲ and εὐθὺς δὲ. The μὲν, δέ, δέ sequence is roughly equivalent to the English “firstly, secondly, thirdly”. The ἅμα, ἅμα, εὐθὺς sequence (in which εὐθὺς is used as a synonym for ἅμα to avoid a second repetition of it) indicates that the ἀκρόμιον performs all these functions simultaneously. It is hardly possible to represent this in English without being unbearably clumsy; but I am sure that Mrs. May’s “forthwith” (see the previous note) is not the meaning of εὐθὺς here.

³² Op. cit., note 26 above.

The other three instances in *De usu partium* reflect the same usage.³³ After describing how the shoulder joint would be cramped if the scapula were not braced back from the rib cage, Galen writes: “. . . All these disadvantages we would suffer as a matter of course were it not that the ἀκρόμιον is kept at a considerable distance from the breast-bone and that nature placed the clavicle between them as a brace.”³⁴

Elsewhere he writes: “. . . Thus the joint at the shoulder is protected not only by these ligaments [ὅπὸ τῶν συνδέσμων] but also by the outgrowths [ἀποφύσεις: *apophyseis*] of the scapula: on the top by the one at the ἀκρόμιον, which some describe as ‘coracoid’, and on the inside by the one called ‘anchor-like’ or ‘sigmoid’ . . .”³⁵ And lastly: “. . . And in addition the muscle which arises from the transverse process of the first vertebra and is attached to the extremities of it [i.e. the scapula] near the ἀκρόμιον pulls this in particular, and together with it the whole scapula, towards the transverse parts of the neck, just as the thin muscle which begins from the lambdoid bone pulls it forwards—this latter muscle is attached to the bone of the shoulder-blade near the ἀκρωμία . . .”³⁶

From Galen’s use of ἀκρόμιον in these passages to the modern “acromion” is but a short step.

SUMMARY

In the Hippocratic corpus, ἀκρόμιον is a general term for the tip of the shoulder; and by a natural specialization it is used by Galen to denote the bony area which can be felt therein (still known as the acromion). The ancient anatomists were, however, ignorant of the exact structure of the shoulder, and the Hippocratic treatise *On joints* contains the earliest reference to the tradition that a third bone was involved in the joint between clavicle and scapula. Both Aristotle and Galen followed this tradition, and Galen records that some authors used ἀκρόμιον as a technical name for this bone, though he does not so use it himself. Another use, by which the word was referred to the joint between clavicle and scapula or the binding thereof, arose from a misapprehension of the Hippocratic passage.

³³ I must therefore disagree with Mrs. May’s statement (op. cit., note 30 above, p. 609, note 46) that “In *De usu partium* Galen uses the term acromium to mean the acromioclavicular articulation.” The term refers merely to the bony area at the tip of the shoulder where the scapula and clavicle merge.

³⁴ XIII 10: op. cit., note 20 above, p. 271, 11. 11–15.

³⁵ XIII 12: *ibid.*, p. 278, 11. 8–12. The adjective “coracoid” is now applied to the second of these apophyses.

³⁶ XIII 13: *ibid.*, p. 283, 11. 18–25. The feminine singular form ἀκρωμία is to be distinguished (in form) from ἀκρόμιον, the plural of ἀκρόμιον. The feminine and neuter forms appear to be doublets, indistinguishable in meaning; the feminine is rarer than the neuter. It occurs in the Hippocratic corpus (e.g. *On joints* XIV: op. cit., note 3 above, p. 238. 1. 88), Pollux’s *Onomasticon* (II 137 and 138) and Galen’s *De usu partium* (XIII 11 and 13: op. cit., note 20 above, p. 274, 1. 20 and p. 283, 1. 25). Aristotle uses it in *Historia Animalium*, but never with reference to humans: it appears at 498b 30, 594b 14 and 630a 24 (for the genitive plural form at 606a 16, which conforms to the others by referring to animals and not man, see note 10 above). Xenophon uses it with reference to horses (*On horsemanship* 1, 11). The feminine and neuter forms are used in similar contexts in the Hippocratic corpus at *On joints* XIV and *Instruments of reduction* I (op. cit., note 3 above, p. 240, 1. 95 and p. 400, 1. 51). This survey has concentrated on the neuter form; the feminine has nothing of importance to add.