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## ON THE ANATOMICAL TERM *TUNICA DARTOS*

*In the medical literature of antiquity the first time a more detailed description of the sexual organs appears is in the work of Aristotle. He does not know the term dartos, however, nor is it to be found in Herophilos, although considering that he introduced the term darsis, excoriation, there is a theoretical possibility that he might have used it. Dartos occurs in preserved Greek sources for the first time in the writings of Rufus of Ephesus, understood as an adjective to the substantive χιτῶν, meaning envelope, mantle or membrane, and then it is used in various grammatical forms. From the chronological point of view, however, the first time we find this term documented is in Roman literature, namely in Celsus. He took over the adjective as a term in its own right, and applied it to the grammatically feminine tunica, not as an adjective but as the name or designation of the integument. Other authors took a similar approach, understanding dartos as an adjectival noun, seldom explaining or inflecting it, and only rarely did they use the Latin name which might have been a terminological equivalent. Ultimately the adjective dartos finds its way into the first codification of anatomical nomenclature, the Basiliensia Nomina Anatomica of 1895, and it persists in that nomenclature to this day.*

**Keywords:** Anatomical Nomenclature; History; *tunica dartos*

*Tunica dartos* in anatomical nomenclature designates the subcutaneous envelope of the scrotum, which is muscular and rich in blood vessels. *Dartos* is „das nichtssagende Wort,“ i. e. a word that says nothing, as Hyrtl<sup>1</sup> aptly put it, and what is more it even appears to have the incorrect ending, which is incomprehensible to anyone who has at least partial knowledge of Latin, as for example present-day medical students have. It is the masculine form of the verbal adjective derived from the verb δέρω, to skin, flay (of animals), separate by avulsion,<sup>2</sup> excoriate, because it comes originally

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<sup>1</sup> HYRTL (1880: 172).

<sup>2</sup> LIDDELL-SCOTT (1996: 380).

from the Greek expression χιτών δάρτος, excoriable tunic, thus named in ancient Greek literature due to its raw and excoriated appearance. Kraus on the other hand bases it on a hypothetical pairing with the substantive σάρξ, i. e. a feminine word, giving the expression σάρξ δάρτος. No such expression is documented in the anatomical literature, however, and so his suggestion that this is an instance of a two-ending adjective, i.e. the feminine form of an adjective ending in *-os*,<sup>3</sup> cannot be considered correct.

This adjective is linked etymologically with the term δάρσις, excoriation, designating the anatomical preparation technique which “consists in removing the skin for exposing the organs covered by it.”<sup>4</sup> According to Galen this term was introduced by Herophilus: ὁ γὰρ ὕμην τῶν ὑποκειμένων σωμάτων ἑαυτῷ ἀπολύεται κατὰ δάρσιν, ὡς Ἡρόφιλος ὠνόμαζεν, ἀπὸ τοῦ δέρω ῥήματος ὄνομα ποιήσας τῆς ἐνεργείας τε καὶ τοῦ πάθους κοινόν,<sup>5</sup> which is to say: For the membrane of the bodies lying underneath it is loosened by “flaying” (darsis) as Herophilus named it. He derived this noun from the verb “I flay”(dero), the name being common both to the activity and to the “being acted upon”.<sup>6</sup>

In the medical literature of antiquity the first time a more detailed description of the sexual organs appears is in the work of Aristotle (384–322 BC),<sup>7</sup> but he does not use the term *dartos*. Later on Herophilus (circa 330–250 BC) focused on the sexual organs, but this term does not figure in any of the preserved fragments of his work either.<sup>8</sup> Herophilus was the creator of several anatomical terms which are still used to this day, and considering the above-mentioned term *darsis*, F. P. Moog suggests that the term *dartos* could also have been derived from Herophilus.<sup>9</sup> Paradoxically, the adjectival use of *dartos* can be found for the first time in ancient medical Greek and Roman literature in the work *De medicina* by the Roman encyclopedist Celsus, who probably worked during the reign of Emperor Tiberius.<sup>10</sup> Describing the integument of the scrotum, Celsus writes: *Super ea valentior tunica est, quae interiori vehementer ima parte inhaeret, dar-*

<sup>3</sup> KRAUS (1844: 295).

<sup>4</sup> DUNGLISON (1866: 288).

<sup>5</sup> GAL. *De anat. admin.* III, 2 (II, 349 K.).

<sup>6</sup> Transl. STADEN (1989: 194).

<sup>7</sup> ARIST. *HA* 3,1,510a14–b4, *GA* 1,4,717a33 seq., cf. STADEN (1989: 166).

<sup>8</sup> Cf. T 101–T 105, STADEN (1989: 211–214).

<sup>9</sup> MOOG (2005: 577).

<sup>10</sup> LEVEN (2005: col. 189).

*ton Graeci vocant*,<sup>11</sup> i. e. Outside this is a stronger tunic, which at its lowest part is closely adherent to the inner one, the Greeks call it *dartos*.<sup>12</sup> The phrase „*Graeci vocant*“ is typical of the way Celsus expresses himself,<sup>13</sup> but in any case it indicates the fact that this term was then used in Greek anatomical terminology.

In the preserved Greek anatomical literature *dartos* occurs for the first time in the writings of Rufus of Ephesus, who lived around 100 AD,<sup>14</sup> or at least in the writings which have been ascribed to him. Describing the scrotum, the author of this work on the anatomy of the human body writes: Σύγκειται δὲ ἐκ χιτῶνων δύο, τοῦ μὲν ἕξωθεν δαρτοῦ καὶ ῥυσοῦ, τοῦ δὲ ἕσωθεν ἐλυτροειδοῦς,<sup>15</sup> i. e. The scrotum is composed of two membranes: the outer one appears scratched and rough, while the inner one is in the form of a spear case.<sup>16</sup> Since ancient Greek anatomy considered the female sexual organs to be analogous to the male, and so the ovaries were thought of as female testicles, thus one of their covering layers was also called *dartos*: Περὶ δὲ τοὺς διδύμους εἰσὶ χιτῶνες ἐλυτροειδεῖς καὶ δαρτοῖ,<sup>17</sup> i. e. Around the woman's "testicles" are case-like and incised membranes.<sup>18</sup> Precise identification of the particular membranes involved, however, is very difficult today.<sup>19</sup>

Galen (129–210 AD) also uses the adjective *dartos* in his description of the female genitals: περιέχει δὲ τούτων ἑκάτερον ὕμην ἴδιος λεπτός, οἷος ἐπὶ τῶν ἀρρένων ὁ δαρτός,<sup>20</sup> i. e. around each of these is a proper thin membrane such as in the males, the *dartos*. Thus the author of the English version does not translate *dartos*, but claims in a footnote that this adjective "in Greek is a general word meaning skin,"<sup>21</sup> which is evidently erroneous.

11 CELS. *Med.* VII, 18.

12 Transl. SPENCER (1994: 391–393).

13 LANGSLOW (2000: 95–117).

14 LEVEN (2005: col. 759).

15 [RUF.] *De dissect. part. corp. hum.* 60.

16 Transl. GERSH (2012: 98).

17 RUF. *De corp. hum. part. appell.* 197.

18 Transl. GERSCH (2012: 62).

19 NICKEL (1971: 87).

20 GAL. *De uteri dissect.* 9 (CMG V 2,1, p. 48).

21 MAYO GOSS (1962: 80).

In the pseudo-Galenic work *Introductio sive medicus*, the author of which was probably a contemporary of Galen himself,<sup>22</sup> *dartos* appears in the description of the testicles: περιέχεται δὲ ὑπὸ δύο χιτώνων, τοῦ τε ἐρυθροειδοῦς καὶ τοῦ δαρτοῦ λεγομένου,<sup>23</sup> i. e. they are covered by two membranes, the so-called *erythrooides* and *dartos*. This is the first incidence of the participle λεγομένου, i. e. called or so-called, which would occur several times later used together with other verbs meaning “call” in connection with this adjective.<sup>24</sup> This was a common feature in the medical terminology of antiquity, and it indicated the terminological status of the nomenclature.

In his encyclopedia the Byzantine author Paulus Aegineta (7th C AD) describes the testicles and mentions the *dartos*: δαρτοὶ δὲ εἰσιν οἱ κολλῶντες ὑμένες τὸ ἐξωθεν δέρμα πρὸς τὸν ἐλυτροειδῆ χιτῶνα προφυόμενοι αὐτῷ,<sup>25</sup> i. e. The *darti* are membranes connecting the external skin to the *tunica vaginalis*, being united to it.<sup>26</sup>

If the occurrence of the designation *dartos* is plotted on the one hand in the later printed editions of the ancient works, and then in the modern medical literature on the other, all the texts are found to have a common feature, which is the alternation of the Greek and Latinized forms of the word, not always used in the nominative either, but also in other cases such as the accusative or ablative. The oldest editions of Celsus have the incorrect Latinized form *darion*,<sup>27</sup> or *darton*,<sup>28</sup> whereas the text of the Aldine edition from the year 1547 has the Greek form δάρτον,<sup>29</sup> and similarly the Linden edition of 1665.<sup>30</sup> The Marx edition in CML uses the Latinized form *darton*, but then declines it in the Greek fashion.<sup>31</sup> Mondino da Luzzi does not use

22 PETIT (2004: LIII–LVIII).

23 [Gal.] *Medicus. Introd.* 11 (XIV, 719 K.).

24 δαρτῶν ὀνομαζομένων GAL. *De anat. adm.* 7, 16 (II, 644 K.), δαρτοὶ προσαγορευόμενοι MELET. *De nat. hom.* 115.

25 PAUL. AEG. VI 60 (CMG IX 2, p. 101–102).

26 Transl. ADAMS (1866: 364).

27 In view of the fact that historical editions of ancient authors might not have the same division into books and chapters as in critical editions used presently, we have chosen the method of quotations prevalent in secondary literature. CELSUS (1478: 153v), (1481: s. p.).

28 CELSUS (1563: 179v).

29 CELSUS (1547: 53v).

30 CELSUS (1665: 483).

31 CELSUS *Med.* VII, 18.

this term,<sup>32</sup> in Berengario da Carpi's anatomy dated 1520 occurs incorrect form *darion*,<sup>33</sup> in one year later commentary to Mondino's *Anathomia* by Berengario da Carpi the same form *darion* is also found.<sup>34</sup> The founder of modern anatomy Vesalius in 1543 uses the Greek form δαρτὸν: (*tunicam*) *veteribus Graecis δαρτὸν appellatam*,<sup>35</sup> i. e. (the integument) called δαρτὸν by the Ancient Greeks. Estienne has the Latinized form *dartos*: *tunica ... , quae Graecis dartos dicitur*,<sup>36</sup> i. e. the integument which the Greeks call *dartos*. Frobenius' Latin translation of Galen in 1549 includes the pseudo-Galenic *Introductio seu medicus*, where the already-mentioned part states: *duabus tunicis conteguntur, quarum tenuiorem Graeci ἐρυθροειδῆ, valentiorem δαρτον appellant*,<sup>37</sup> i. e. they are covered by two integuments, the thinner of which the Greeks call ἐρυθροειδῆ, the thicker δαρτον. On the other hand, the same edition of Galen then has the Latinized form in the part on the anatomy of the uterus: *propria pellicula tenuis, qualis est quae in maribus dartos a graecis appellatur*,<sup>38</sup> i. e. its own thin integument, similar to that found also in men, and called *dartos* by the Greeks. The Venetian Latin edition of Galen has another variant: *Horum uterque propria membrana, qualis est in maribus, quam dartam, hoc est excoriabilem dicunt, conteguntur*,<sup>39</sup> i. e. Each of them (the ovaries) is covered by its own membrane, like that found in men, which is called *dartos*, that is excoriable. Apart from the fact that this translation attempts a consistent Latinization of the Greek adjective, understanding it as a feminine, it also includes an explanatory addition in the form of the Latin adjective *excoriabilis* as the equivalent of the Greek *dartos*. One other instance of this can be found, namely in van Spiegel's work of 1627.<sup>40</sup> These infrequent Latin equivalents, however, did not have the status of a medical term, but rather of more detailed explanation. There is an explicit comment on the possibility of translation in 1726 by William Clinch, who translated Rufus' work into Latin. At the same point in Rufus' text *De appellatione*, in his Latin version he adds: *circa testes tunicae sunt Latinis carentes nominibus a Graecis autem erythroides*

32 MONDINO (1482: s.p.).

33 BERENGARIO DA CARPI (1520: 19v).

34 BERENGARIO DA CARPI (1521: CCXC).

35 VESALIUS (1543: 522).

36 ESTIENNE (1545: 194).

37 GALENOS (1549, Vol. 0: 211).

38 GALENOS (1549, Vol. 1: 399).

39 GALENOS (1565, Vol. 2: 109).

40 SPIEGEL (1627: 269).

*una, dartos altera nominatur*,<sup>41</sup> i. e. around the testes there are membranes, lacking names in Latin, but the Greeks call one *erythroides*, the other *dartos*. The Greek adjective *dartos* is later frequently mentioned in other anatomical works, in the formula (*membrana, tunica*) *quae* (*Galeno, Celso, Rufo*) *dartos dicitur*,<sup>42</sup> and it was applied without inflection, e. g. *tunicae dartos*,<sup>43</sup> *tunicam dartos*.<sup>44</sup> A formula similar to *dartos dicitur* has taken root in modern languages as well, e.g. *est appellée dartos*,<sup>45</sup> named the tunic *dartos*.<sup>46</sup> Only seldom do attempts at Latinization appear, such as *dartus*,<sup>47</sup> *tunica dartus*,<sup>48</sup> *tunica darta*.<sup>49</sup>

To sum up in conclusion, it appears that in the medical literature of antiquity the first more detailed description of the sexual organs appears in the work of Aristotle. He does not know the term *dartos*, however, nor is it to be found in Herophilos, although considering that he introduced the term *darsis*, excoriation, there is a theoretical possibility that he might have used it. *Dartos* occurs in preserved Greek sources for the first time in the writings of Rufus of Ephesus, evidently understood as an adjective to the substantive *χιτών*, meaning envelope, mantle or membrane, and then it is used in various grammatical forms. From the chronological point of view, however, the first time we find this term documented is in Roman literature, namely in Celsus. He took over the adjective as a term in its own right, and applied it to the grammatically feminine *tunica*, not as an adjective but as the name or designation of the integument. Other authors took a similar approach, understanding *dartos* as an adjectival noun, seldom explaining or inflecting it, and only rarely did they use the Latin word *excoriabilis*, which might have been a terminological equivalent. Ultimately the adjective *dartos* finds its way into the first codification of anatomical nomenclature, the *Basiliensia Nomina Anatomica* of 1895, and it persists in that nomenclature to this day.<sup>50</sup>

41 RUFUS EPHESIUS (1726: 41).

42 COLOMBO (1559: 238); BAUHIN (1605: 218); SPIEGEL (1627: 269); BARTHOLIN (1651: 137).

43 LENHOSSÉK (1818: 89).

44 JORDAN (1834: 12).

45 DE GRAAF (1649: 11).

46 QUAIN (1867: 964).

47 BLANCKAERT (1748: 252).

48 KRAUS (1844: 295).

49 KOSSMANN (1903: 306) with a note: *Dartos ist ein Adjectivum von drei Endungen, also heisst es: Hymen dartos, aber Tunica darta.*

50 *Terminologia anatomica* (1998: 70).

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## RESUMÉ

V antickej medicínskej literatúre sa vyskytuje podrobnejší opis pohlavných orgánov prvýkrát až u Aristotela, ale on termín dartos nepozná, nie je doložený ani u Herofila, hoci tu vzhľadom na to, že zaviedol termín darsis, excoriation, existuje teoreticky možnosť, že ho používal. V zachovaných gréckych prameňoch sa dartos prvýkrát vyskytuje v spisoch Rufa z Efezu, chápe sa ako adjektívum k substantívu χιτών, obal, plášť, blana, a používa sa v rôznych gramatických tvaroch. Z chronologického hľadiska však prvýkrát tento termín je doložený až v rímskej literatúre a to u Celsa. Tento prevzal už len adjektívum ako termín a priradil ho ku gramatickému feminínu tunica nie ako adjektívum, ale ako názov, pomenovanie obalu. Podobne postupovali iní autori, chápali ho ako spodstatnené adjektívum a len málokedy uvádzali latinský názov, ktorý by mohol byť terminologickým ekvivalentom a zriedkavo ho vysvetľovali alebo skloňovali. Napokon sa adjektívum dartos dostalo aj do prvej kodifikácie anatomického názvoslovía, do Bazilejského anatomického názvoslovía, a pretrváva v ňom dodnes.

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