

## LETTER TO THE EDITOR

# HEART IN THE WORK OF THE EMINENT GREEK PHILOSOPHER AND PHYSICIAN ARISTOTLE (384-322 BC)

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Received 21 Oct 2020, Accepted 19 Nov 2020

<https://doi.org/10.31688/ABMU.2020.55.4.24>

### ABSTRACT

Aristotle (384-322 BC), the founder of the peripatetic sect of philosophers was a polymath and his work covers almost every major area of human inquiry such as physics, biology, metaphysics, ethics, rhetoric and politics. However, it seems that he had an inclination for the investigation of nature and human being. The heart is considered by Aristotle as the source of life, the part wherein the “psychical fire“ is kept burning, the place of passions where all the feelings end and the true seat of the soul. His notions on anatomy were revised by the physicians of the Alexandrian school of medicine, but they prevailed over centuries till the leading discovery of William Harvey (1578-1657) on blood circulation.

**Keywords:** Aristotle, history of cardiology, heart.

### RÉSUMÉ

**Le cœur dans l'œuvre de l'éminent philosophe et médecin grec Aristote (384-322 av. J.-C.)**

Aristote (384-322 avant J.-C.), le fondateur de la secte péripatéticienne des philosophes, était un polymathe et son travail couvre presque tous les grands domaines de l'enquête tels que la physique, la biologie, la métaphysique, l'éthique, la rhétorique et la politique. Cependant, il semble qu'il avait un grand intérêt pour la nature et l'être humain. Le cœur est considéré par Aristote comme la source de la vie, où «le feu psychique» continue à brûler, le lieu des passions où finissent tous les sentiments et le véritable siège de l'âme. Ses notions d'anatomie du cœur ont été révisées par les médecins de l'école médicale d'Alexandrie, mais elles ont prévalu pendant des siècles jusqu'à la découverte de William Harvey (1578-1657) sur la circulation sanguine.

**Mots-clés:** Aristote, histoire de la cardiologie, cœur.

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Aristotle, the founder of the peripatetic sect of philosophers, was born in 384 BC in Stagyrá, Northern Greece. Pupil of the great philosopher Plato (c. 428-c. 348 BC) and tutor of Alexander the Great (356-323 BC), Aristotle was a polymath and his work covers almost every major area of human inquiry, such as physics, biology, metaphysics, ethics, rhetoric, and politics. However, it seems that he had an inclination for the investigation of nature and human being. According to his biographer Diogenes Laertius (180-240), Aristotle wrote nine books on anatomy and two books on medicine which have been lost. His work on biology survived such as *History of Animals* (*Historia animalium*), *Movement of Animals* (*De motu Animalium*) and *Generation of Animals* (*De generatione animalium*) dealing with anatomy, physiology and reproduction<sup>1</sup> (Figure 1).

The heart is considered by Aristotle as the source of life, the part wherein the “psychical fire” is kept burning, the place of passions where all the feelings end, and the true seat of the soul. He believed that heart is the first organ to form in the body of the fetus, since it is the source of perceptions. He sustained that it had three ventricles, situated above the lung: the largest on the right, the smallest on the left and the medium-sized in the middle. He mentioned that of these three ventricles, the right had the most abundant blood, correlating this finding with the remark that the limbs on the right sides of the body are warmer than those on the left<sup>2</sup>. However, it is strange for someone like Aristotle who performed extensively dissections on animals to believe that heart had three ventricles and it seems that he regarded the right atrium as a venous dilatation and not as part of the heart<sup>3</sup>. Moreover, he tried to connect the tri-ventricular scheme with his perception of the circulatory system. He referred to two main blood-vessels of distinct origins with their own blood that kept separate: aorta and great vein (*vena cava*) which represents the arterial and venous circulation. Ignoring their connection, Aristotle considered that venous circulation was transferring blood from the heart to the rest of the body sustaining also that arterial circulation did not carry blood. He noticed that these blood transporting vessels become smaller and smaller until “their tubes are too fine to admit the blood”<sup>2</sup>. Through these small arterioles, he mentioned, it could pass the excretion of moisture, the sweat, only when the body gets warm and the veins open wider. Aristotle did not realize the presence of capillaries and the circular motion of the blood and he believed that the vessels ended in the skin<sup>2</sup>. Furthermore, he believed that in the heart, at the base of the viscera, a bone (*os cordis*) was formed and it served as a framework. Its view was adopted by most of the physicians



**Figure 1.** Imaginary portrait of Aristotle.  
Source: Wellcome Library, London

who followed him: Galen (129-201) and Arabo-Islamic physicians mentioned erroneously that *os cordis* was present at the heart of elephants while the physician and astronomer Cornelius Gemma (1535-1578) referred to two heart bones found in human heart. Actually, they were referring to the fibrous trigone of the heart which in some animals undergoes mineralization with age, giving the impression of a bone<sup>4</sup>.

Aristotle's views on heart were revised thanks to the work of the Alexandrian physicians Herophilus (323-285 BC) and Erasistratus (310-250 BC) who performed dissections and even vivid sections in humans and animals<sup>5</sup>. Despite the discoveries on human heart, medieval physicians such as Averroes (1126-1198) and Renaissance physicians such as Alessandro Achillini (1463-1512) and Nicolas Massa (1489-1569) followed Aristotle's anatomical ideas. Aristotelian heart model prevailed over centuries till the leading discovery of William Harvey (1578-1657) on blood circulation<sup>4,6</sup>.

#### Author Contributions:

C.T. conceived the original draft preparation. C.T., K.K., P.I., G.A. and M.K. were responsible for conception and design of the review. C.T., K.K., P.I., and G.A. were responsible for the data acquisition. C.T., K.K., P.I., G.A. and M.K. were responsible for the collection and assembly of the articles/published data, and their inclusion and interpretation in this review. C.T., K.K., P.I., G.A. and M.K. contributed equally to the present work. All authors contributed to the critical revision of the manuscript for

valuable intellectual content. All authors have read and agreed with the final version of the manuscript.

**Compliance with Ethics Requirements:**

„The authors declare no conflict of interest regarding this article“

„No funding for this study“

**Acknowledgements:**

None

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