

Neurology and philosophy: Bernardino Telesio and the nervous system

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Philosophical works may be a mirror of medical knowledges of that historical period. Analyzing the philosophical thinking of the Italian philosopher and natural scientist Bernardino Telesio (1509-1588) (Fig. 1), we report a clear example of relationship between philosophy and neurology. Until the sixteenth century, the philosophical and medical knowledge were still influenced from the Greek thinkers. Based on Aristotelian theories, the heart was considered the human bodily central organ and he seat of the soul (1). Galen elaborated the Hippocrates' bodily humors theory and he sustained the existence of a tripartite soul (the rational soul located in the brain, the spiritual soul in the

heart, and the appetitive soul in the liver) controlling specific bodily (2). The sixteenth century was characterized by important scientific and philosophical revolutions. Andreas Vesalius conducted dissections on human cadavers and challenged the anatomical knowledge of Galen. His work "*De humani corporis fabrica*" included detailed images of the cerebral ventricles, meninges, cranial and peripheral nerves, cerebral and spinal vascularization (3). Telesio's philosophical thinking and work are placed in that historical time. Although his theories were later disproved, Telesio may be considered the precursor of the modern scientific method. His philosophical thinking influenced important philosophers and scientists, such as Galileo Galilei, René Deschartes and Francis Bacon (4). Moreover, he was one of the first philosophers of that time to explore brain and neuronal functions in the sense perception. In his main work *De Rerum Natura Iuxta Propria Principia*, Telesio opposing to Aristotle's theories, stated that the true knowledge of the nature and its phenomena «is to be searched not by reason, but is to be understood by means of observation (*sensu percipiendam*)» (5). Opposing to Galenic theories on the tripartite soul, in his work entitled «*Quod animal universum ab unica animae substantia gubernatur. Contra Galenum*», Telesio argued the existence of only one soul. He hypothesized that the soul was a specific part of the body and defined it as "*spiritus*" coursing through the nervous system and having its main place in the brain (6). He stated that «the spirit, located in the brain ventricles and in the nervous system, is the



Figure 1. Bernardino Telesio (Cosenza, 7 novembre 1509 - Cosenza, 2 ottobre 1588)

soul's substance... it is demonstrated by the death immediately occurring when dense air enters in the ventricles and the most important nerves are injured»(5). The nervous system, played an important role in Telesio's theory. The knowledge occurred through the senses. Telesio suggested that: «Sense perception can only be the perception of the activities of things and impulses in the air, and can only consist of the perception of [the spirit's] own passions, transformations and movements, particularly the latter. Indeed, the spirit perceives them because he perceives that it is affected by them, that it is being changed and moved.» (5). He identified the touch as the primary sense. He described a mechanical process starting from the sense organs that are «parts of the body which are either more subtle or soft than others, or perforated and open...in order to provide an easy and open entry to the forces of external things and to those things themselves.» (5). Subsequently, the sensorial impression is transferred through the nerves to the brain. Here resides the spirit which experiences nervous contractions and dilatations and judges these sensations. The ability of making rational conclusions consists in comparing new experiences to old ones and in supplementing hidden or unknown aspects when referring them to former experiences. In conclusion, analyzing Telesio's philosophical thinking,

we unexpectedly found important references to neurology: he stated the central role of the brain in the human physical and mental functions, he considered the tactile sense as the primary sense and provided an early rough neuronal explanation of sense perception.

References

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