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## Plato, Galen, and the Center of Consciousness

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It may seem strange to suggest that Plato, the philosopher of the eternal, unchanging and immaterial Ideas, should be of any relevance to the history of the eminently practical science and art of medicine. By and large we tend to think of Plato as he is characterized by Georgio de Santillana, who writes: "The center of gravity of Plato's thought lies entirely elsewhere, in the realm of Ideas which are supposed to exist somehow beyond the world, to be contemplated only by the eye of the mind. . . . Plato's conception of science has nothing to do with anything happening in time and space."<sup>1</sup>

However, closer investigation turns up surprising evidence that Plato incorporated contemporary medical theory into his own writings<sup>2</sup> and, even more surprising, that the anatomical, physiological, psychological, and pathological theories he develops, especially in the *Timaeus*, were taken very seriously by subsequent medical authorities and had their influence upon the history of medical science in the West. It appears that Plato not only exerted his first influence upon the scientific tradition

<sup>1</sup> G. de Santillana, *The Origins of Scientific Thought* (Chicago, 1961), 195, 197. This impression is negatively confirmed by the handbooks on the history of medicine. We search in vain for Plato's name in the index of C. Singer and E. Underwood's *A Short History of Medicine* (2nd ed., Oxford, 1962), for example. And even a more specialized monograph like H. O. Taylor's *Greek Biology and Medicine* (New York, 1922) passes over Plato in silence.

<sup>2</sup> For Plato's use of contemporary medical teaching in his own account of disease, see H. Miller, "The Aetiology of Disease in Plato's *Timaeus*," *TAPA*, 93 (1962), 175-187, with bibliographical notes. For Plato's acceptance and elaboration of contemporary physiological theory, see T. Tracy, S.J., *Physiological Theory and the Doctrine of the Mean in Plato and Aristotle* (Chicago, 1969), esp. pp. 142-156.

indirectly through Aristotle,<sup>3</sup> but that he was recognized by later specialists in medical science as an authority in his own right.<sup>4</sup> And by one at least he was even preferred to Aristotle.

This striking instance of Platonic influence is the impact which he seems to have had upon Galen, the most distinguished physician of antiquity after Hippocrates. Ludwig Edelstein sums up his expert impression when he remarks of Galen that "Plato and Hippocrates were his gods; Aristotle he held in sincere respect."<sup>5</sup> Phillip De Lacy, in his interesting and important study of Galen's Platonism,<sup>6</sup> has clearly established that Galen must be considered, as he considered himself, fundamentally a Platonist, but one who drew upon the dialogues directly rather than upon the interpretations of other Platonists and exercised the right to correct or to develop Plato's doctrines in the light of his own research. Galen's esteem for Plato is evidenced by the fact that he synopsized the Platonic dialogues in eight books and composed nine other separate treatises explaining and defending various aspects of Platonic doctrine. Throughout Galen's works quotations from Plato are frequent and generally accurate, so that Joseph Walsh, in a study of Galen's writings and the influences inspiring them, is led to remark: "From very many quotations, second only in number to those from Hippocrates, it is evident Galen knew the Founder of the Academy almost word for word."<sup>7</sup>

That Galen was interested in Plato not only as a philosopher but also as an authority in what we call the "life sciences" is clear from his frequent references to Plato's anatomical, physiological, psychological, and medical theories. In addition to his summary of the *Timaeus* Galen wrote a commentary in four books specifically entitled *On the Medical Statements in the*

<sup>3</sup> Despite large differences Aristotle obviously followed Plato in many notions basic to his biology—the dual principle of material body and spiritual soul; the elemental bodies, earth, air, fire, and water; their qualities and (unlike Empedocles) their transmutability; the teleology of nature and organisms; the concept of health as dynamic equilibrium; etc. For Plato's formulation of scientific method before Aristotle, see L. King, "Plato's Concept of Medicine," *Journal of the History of Medicine*, 9 (1954), 38-48.

<sup>4</sup> Early evidence for this is provided by the second century A.D. medical papyrus *Anonymus Londinensis*, based in part on a collection of medical opinions attributed to Menon, Aristotle's associate. In citing two groups of medical authorities on the etiology of diseases, the papyrus places Plato at the head of the second group, reporting his views (largely from the *Timaeus*) in some 180 lines while devoting only 144 lines to the views of the other five authorities in this group. See W. H. S. Jones, *The Medical Writings of Anonymus Londinensis* (Cambridge, England, 1947), pp. 59-71.

<sup>5</sup> *OCD* (2nd ed., Oxford, 1970), s.v. Galen, 454.

<sup>6</sup> P. De Lacy, "Galen's Platonism," *AJP*, 93 (1972), 27-39.

<sup>7</sup> J. Walsh, "Galen's Writings and the Influences Inspiring Them," *Annals of Medical History*, N.S. 6 (1934), 148.

*Timaeus*.<sup>8</sup> Walsh has this to say of the matter: "Plato was not only the chief authority in philosophy, but his *Timaeus* was depended on in the study of physiology and biology. . . . To understand much of Galen's physiology and biology the *Timaeus* should be read, and to a physician it is one of the most interesting of Plato's works."<sup>9</sup>

These studies indicate clearly, then, that the influence of Plato upon Galen was profound. And there is much to be done in tracing the details of this influence upon individual works and upon various aspects of Galen's thought as a whole. However, at present I should like to consider a previous question which strikes me as interesting and equally challenging. The question is this: If, as seems clear, Galen were thoroughly acquainted with Aristotle and the other philosophers, both Greek and Roman, up to his time, why was it that he should somewhat surprisingly prefer Plato, referring to him as "the most divine Plato" and judging him "the foremost of all philosophers" as Hippocrates is the greatest of physicians?<sup>10</sup>

In his work *On the Natural Faculties* Galen gives his own sound principle for evaluating the work of his predecessors when he advises that to be outstanding in knowledge one must "become possessed with an ardent love for truth" and must "learn thoroughly all that has been said by the most illustrious of the Ancients. And when he has learned this, then for a prolonged period he must test and prove it, observing what part of it is in agreement, and what in disagreement, with obvious fact; thus he will choose this and turn away from that."<sup>11</sup>

If we assume that Galen followed his own advice, what might he include in the body of "obvious fact" that would have led him to choose Plato and turn away from Aristotle and other philosophers? Of course his motivation must have been very complex and his reasons philosophical as well as scientific. But I would like to suggest that one of the reasons for his attraction to Plato may be closely linked with Galen's investigations in neuroanatomy and their application to the center of consciousness.

We who have grown up associating the center of conscious life with the brain may find it difficult to conceive of a time when this was not obvious even to the most advanced investigators. But turning back in imagination to the fourth century B.C.—before the discovery of the nervous system, the

<sup>8</sup> *De iis quae medice scripta sunt in Timaeo*, ed. H. Schroeder and P. Kahle, *CMG*, Suppl. I (Leipzig, 1934). Only fragments are extant.

<sup>9</sup> See note 7 above, p. 148.

<sup>10</sup> Plato "most divine": *De placitis Hippocratis et Platonis* IX, 9 (Kühn V, 792); "foremost of all philosophers": *op. cit.*, III, 4 (Kühn V, 319).

<sup>11</sup> *De naturalibus facultatibus* III, 10 (Kühn II, 179-180) as translated by A. Brock, *Galen on the Natural Faculties* (London, 1916), 279.

distinction between veins and arteries, and the circulation of the blood—it may be easier to understand why people might question whether the center of thought and feeling lies in the head or in the heart.

The earliest pioneers of medical science in the West in fact were split on this issue. Alcmaeon of Croton, the physician-scientist commonly associated with the Pythagoreans early in the fifth century B.C., seems to have placed the center of life and consciousness correctly in the brain and sees consciousness as dependent upon it.<sup>12</sup> However, perhaps a generation later the physician-philosopher, Empedocles of Agrigentum, founder of the Sicilian school of medicine, identified sensation or thought closely with “the blood around men’s hearts.”<sup>13</sup> In the Hippocratic Corpus the work on epilepsy, *The Sacred Disease*, strongly asserts that the brain is the center of consciousness and intelligence (14, Littré, VI, 386–388 = Loeb, XVII, 174), while the Hippocratic treatise *On the Heart* associates intellection with that organ, claiming that “the intelligence (gnômê) of man is innate in the left ventricle and controls the rest of the soul” (10 *ad finem*, Littré, IX, 88).

In this situation Plato proposed, on rational rather than empirical grounds, that there are in man three vital principles or souls, of which the rational soul—the principle of intellectual awareness and thought—is centered in the brain; while the affective and nutritive principles are somehow “rooted” in the spinal marrow and centered respectively in the regions of the heart and of the liver (*Timaeus*, 44 D; 69 C–77 B). In the healthy individual the activities of the vital principles centered about the heart and liver are subordinate to those of the rational soul housed in the brain and are, at least indirectly, subject to its governance (see especially *Timaeus*, 69 D–70 B).

Aristotle, as we know, did not adopt the Platonic model of the human organism but instead proposed a single vital principle or soul capable of intellectual, sensitive, affective, and nutritive activities, of which the principal organ was the heart.<sup>14</sup> Knowing nothing of the nervous system, Aristotle had to assume that sensory impulses were carried somehow (through the blood vessels?) to the heart, where they are mediated

<sup>12</sup> *De Sensu*, 25 (DK 24 A 5). There is question, of course, about Alcmaeon’s date. On this, and the whole problem in early Greek thought of the path and central organ of sensation and movement, see the masterful study of Friedrich Solmsen, “Greek Philosophy and the Discovery of the Nerves,” *Museum Helveticum*, 18 (1961), 150–167, 169–197. On the location of the central organ, see esp. pp. 191–193.

<sup>13</sup> DK 31 B 105. But see note 12 above, pp. 157–158.

<sup>14</sup> One soul with various faculties: *De An.*, 411 A 26–B 27, 413 A 11–32; heart the principal organ: *Parva Nat.*, 468 A 13–469 A 10.

through the central sense power.<sup>15</sup> Motor reactions are for him inaugurated in the heart, which controls activity in the extremities through a system of sinews, called *neura* (nerves) connecting the rest of the body mechanically with the heart.<sup>16</sup> The controlling intellect, insofar as it needs a bodily organ, is for Aristotle dependent upon the heart.<sup>17</sup> The voice, by which man expresses his thoughts and feelings, is controlled from the heart.<sup>18</sup> The heart, he believes, is the first organ to develop in the embryo (*De Gen. An.*, 742 B 34-39). And in the mature organism the central location of the heart is seen as appropriate for the source of vital functions affecting all extremities (*De Part. An.*, 665 B 18-22, 666 A 13-16). Aristotle's view was propagated by his followers in the Peripatetic school through Hellenistic and Roman times.

This view of the heart as the center of consciousness and vital activities was also shared by Aristotle's contemporary, the physician Diocles of Carystos (fl. 320), known at Athens as the "second Hippocrates,"<sup>19</sup> and by Praxagoras of Cos (fl. 300), who succeeded Diocles as leader of the Dogmatic School of medicine and is credited with distinguishing veins from arteries.<sup>20</sup> The cardiocentric view of man gained widest popular acceptance, however, through the new philosophies of Stoicism and Epicureanism which appeared during the next century and became the dominant philosophical schools of Roman times, propagated especially through the writings of the Stoic Chrysippus of Soli, and the Roman Epicurean poet Titus Lucretius Carus.<sup>21</sup> Both Stoics and Epicureans,

<sup>15</sup> Heart the seat of the central sense power and source of the vascular system: *De Part. An.*, 647 A 25-B 8; 665 B 10-666 A 17, *Parva Nat.*, 455 B 34-456 B 12; sensation affected by the quantity of blood: *Parva Nat.*, 461 B 11-30, and its quality: *De Part. An.*, 656 B 2-6; no bloodless parts have sensation, though blood itself not sensitive: *De Part. An.*, 666 A 17-18.

<sup>16</sup> Motor reactions controlled from the heart through sinews: *De Part. An.*, 666 B 14-18, *Hist. An.*, 515 A 27-B 7.

<sup>17</sup> Even in highest operations intellect needs phantasms: *De An.*, 431 A 14-B 9, 432 A 13-14; phantasm produced by central sense power: *Parva Nat.*, 449 B 30-450 A 25; central sense power in the heart: see note 15 above.

<sup>18</sup> *De Gen. An.*, 776 B 12-19, 786 B 7-23, 787 B 6-788 A 10. See A. L. Peck, *Aristotle: Generation of Animals* (Cambridge, Mass., 1953), p. 592, Appendix B, No. 31: "... it is clear that the heart is the *archê* of the voice."

<sup>19</sup> M. Wellman, *Die Fragmente der sikelischen Ärzte* (Berlin, 1901), pp. 14-15, 122-123.

<sup>20</sup> F. Steckerl, *The Fragments of Praxagoras of Cos and His School* (Leiden, 1958), pp. 2-3 (his dates), 17-21 (arteries, distinct from veins, originate in the heart and terminate in "nerves" which control all voluntary movement).

<sup>21</sup> The Stoics: see H. von Arnim, *Stoicorum Veterum Fragmenta* (reprint, Stuttgart, 1968), II, 228, 235-244 (esp. 244, No. 894); the Epicureans: see, for example, Lucretius, II, 269-271; III, 136-144; 288-301.

though at odds on most other matters, agreed in making the heart the center of consciousness and control.

Meanwhile, some fifty years after the death of Aristotle, in the first part of the third century B.C. at Alexandria, the brilliant physician and scientist Herophilus of Chalcedon achieved the first real breakthrough in neuroanatomy, leading him to reassert the primacy of the brain as the center of consciousness and intelligence. Herophilus was the first to discover the true nature of nerves, to distinguish motor from sensory nerves, and to recognize the brain as their central organ.<sup>22</sup> His discoveries were further advanced by a younger contemporary at Alexandria, Erasistratus of Chios, who traced the cranial nerves to the brain itself and distinguished cranial sensory from cranial motor nerves.<sup>23</sup> However, though the school of Herophilus and Erasistratus continued at Alexandria, knowledge of the brain and nervous system apparently remained fairly static, and largely ignored, for more than 300 years until just before the time of Galen.<sup>24</sup>

Galen, born in A.D. 129, received his early education in his native Pergamum, first in philosophy and then in medicine. At twenty he moved to Smyrna for advanced studies in both fields, then to Corinth, and finally to the center of scientific medicine at Alexandria, where he completed his studies, becoming familiar with the achievements of Herophilus and Erasistratus as revived and advanced in the generation before him. He returned to Pergamum at twenty-eight and there served as physician to gladiators, a post which must have provided extraordinary opportunities for anatomical and physiological observation. Four years later he decided to seek his fortune in the capital city of the empire, and so in A.D. 162, at the age of thirty-three, he moved to Rome.

In his work on *Prognosis*, addressed to Epigenes, Galen gives details of

<sup>22</sup> Galen, *De usu partium*, VIII, 11 (Kühn, III, 667), *De anatomicis administrationibus*, IX, 3 (Kühn, II, 719), *De locis affectis*, III, 10 (Kühn, VIII, 212); Rufus of Ephesus, ed. C. Daremberg and C. E. Ruelle (Paris, 1879), pp. 184-185. See also Solmsen (see note 12 above), pp. 184-194, and the excellent introduction in M. T. May, *Galen: On the Usefulness of the Parts of the Body* (Ithaca, N.Y., 1968), I, 24-26.

<sup>23</sup> Galen, *De placitis Hippocratis et Platonis*, VII, 3 (Kühn, V, 602-604), *Hippocratis aphorismi et Galeni in eos commentarii*, 50 (Kühn, XVIII, pt. 1, 86); Rufus of Ephesus, Daremberg and Ruelle, p. 185. See note 22 above, pp. 26-28.

<sup>24</sup> The achievements of Herophilus and Erasistratus were preserved in the writings of Rufus of Ephesus, who flourished at the turn of the first and second century A.D. In the generation before Galen, Marinus of Alexandria and his school revived and developed the work of Herophilus and Erasistratus. These advances in anatomy and physiology were incorporated in Marinus' work on anatomy in twenty books, of which Galen made a compendium in four. Moreover, two of Galen's teachers, Satyrus and Numisianus, studied under Quintus, a younger associate of Marinus and a great anatomist in his own right. See note 22 above, I, 29-36.

his rise to prominence at Rome (2-5; Kühn, XIV, 605-630). He recalls that he was invited to the home of Eudemus, a Peripatetic philosopher who "believed my only significant ability lay in philosophical speculation, and that I was concerned with medicine as a side line" (2; Kühn, XIV, 608). However, Eudemus fell ill with recurrent fever, which provided Galen with the opportunity of serving him as a physician. When his intervention proved more effective than that of the established physicians already in attendance on Eudemus, Galen won the respect not only of his patient but also of other prominent Romans, "almost all those distinguished at Rome for position and learning," as he modestly remarks (2; Kühn, XIV, 612). These included the consul Flavius Boethus, who, like other of Eudemus' friends, was an earnest and enthusiastic Aristotelian. Upon learning that Galen was especially devoted to anatomical studies, Boethus and others asked that he explain the anatomy and physiology of respiration and voice production (*ibid.*). Both Aristotelians and Stoics regarded these functions as ultimately dependent upon the heart, while Galen had evidently claimed that he could demonstrate their dependence upon the brain. Eventually, then, arrangements were made by Boethus for public demonstrations and discussion. Galen refers to these as his "battle against the Stoics and Peripatetics" (5; Kühn, XIV, 626).

The sessions were convened before all those at Rome "distinguished in medicine and philosophy" and lasted several days, during which Galen demonstrated on living animals that inhaling and exhaling come about by dilation and contraction of the thorax through muscle controlled by nerves originating in the spine and that voice is produced through voluntary expiration modulated by the cartilages of the larynx, which are moved by muscles controlled through nerves originating in the brain (5; Kühn, XIV, 629-630). By these facts, demonstrated publicly, Galen felt that he had refuted the Stoics and Peripatetics and vindicated the position of Plato and Hippocrates that the center of consciousness and intellect lay in the brain, since the voice which conveys man's thoughts and feelings is controlled by nerves originating ultimately in that organ.<sup>25</sup> Galen reports that

<sup>25</sup> Compare *De usu partium*, XVI, 3 (Helmreich, II, 386): "Because the voice, which reports the thoughts of the mind, is the most important of all the works of the soul, it must of course be produced by instruments receiving nerves from the brain . . ." This and subsequent passages from *De usu partium* are presented in May's translation (see note 22 above) with slight modifications. That Galen sees himself in this controversy not only as opposing Aristotle and the Stoics but also as vindicating Plato and Hippocrates will be clear from the whole tenor of his work *On the Teachings of Hippocrates and Plato*, where he specifically champions the position ascribed to Plato and Hippocrates, that the brain is the source of voluntary activity like voice, against that of Aristotle and Chrysippus. See, for example, *De placitis Hippocratis et Platonis*, II, 8 (Kühn, V, 277-278).

Boethus and the others were quite convinced and, at the request of Boethus, Galen dictated for permanent record all he had said and done on the occasion (5; Kühn, XIV, 630).

Three of Galen's principal works, begun during his first stay in Rome, are concerned with establishing the centrality of the brain and the Platonic position in various ways. First, in his work *On Anatomical Procedures* Galen records an even more famous and decisive demonstration of the controlling function of brain and spinal nerves (VIII, 9; Kühn, II, 696-698). By progressive section of the spinal chord he showed that continuity of spinal nerves and brain is needed at various levels for maintaining specific life functions. Thus, section between the first and second vertebrae brings death; between the third and fourth, arrested respiration; below the sixth, paralysis of thoracic muscles; and lower, paralysis of limbs, bladder, intestines. This exploration of the spinal chord is regarded as one of his most remarkable achievements.

Second, the largest of Galen's so-called philosophical works is written specifically *On the Teachings of Hippocrates and Plato* in nine books, of which six were completed during his first stay in Rome.<sup>26</sup> Galen's purpose in the work, as he tells us, is "to discuss the powers (or faculties) that govern us, whether they all originate in the heart alone, as Aristotle and Theophrastus think, or whether it is more satisfactory to postulate three sources (*archai*) for them, as Hippocrates and Plato believe" (VI, 1; Kühn, V, 505). The first five books are taken up with refutation of Aristotle, Chrysippus, Praxagoras and others who hold for the centrality of the heart, and include empirical evidence from Galen's medical experience and dissections proving that pressure or injury to the heart does not cut off consciousness and activity, while in the case of the brain they do.

In the later books of this work Galen argues positively for the Platonic and, as he claims, Hippocratic conception of man as animated by three locally distinct and mutually cooperative souls functioning through the brain, the heart, and the liver. Elsewhere he summarizes his position as follows:

I have shown in my book *On the Teachings of Hippocrates and Plato* that the brain and the spinal medulla are the source of all the nerves (the brain being in its turn the source of the spinal medulla itself); that the heart is the source of all the arteries and the liver of the veins; and that the nerves receive the psychic power (faculty) from the brain, the arteries the power of pulsation from the heart, and the veins the natural power (faculty) from the liver. The usefulness of the nerves, then, would lie in conveying the power of sensation and motion from its source to the several parts . . .<sup>27</sup>

<sup>26</sup> Galen, *De libris propriis*, 1 (Kühn, XIX, 15).

<sup>27</sup> *De usu partium*, I, 16 (Helmreich, I, 32-33), May (see note 22 above), I, 89.

It will be evident from this that Galen has adopted, with elaborations of his own, Plato's tripartite soul centered in brain, heart, and liver.

Finally, Plato's influence upon Galen is illustrated in another work, begun at this time and destined to become his most popular. This is his work *On the Usefulness of the Bodily Parts*, a combination of anatomy, physiology, and philosophy intended to show how the organs of man's body are perfectly suited to their functions because they were designed for this purpose by Nature and by Nature's divine Craftsman. Though Galen frequently acknowledges his debt to Aristotle's writings, especially the *De Partibus Animalium*, the basic conception of this work is Platonic, being a development of the enterprise of the *Timaeus* in showing how the goodness of the Dêmiourgos is communicated in the formation of each organ of the human body.<sup>28</sup> And nowhere is Galen more vigorous in his opposition to Aristotle than in his discussion of the brain (VIII, 2 ff.; Helmreich, I, 445 ff.). Aristotle's notion that the brain's function was to cool the heat of the heart is labeled utterly absurd (VIII, 2; Helmreich, I, 446). Aristotle is severely chided for not observing, or not trusting his observation, that the brain is warm to the touch (VIII, 3; Helmreich, I, 449). And to Aristotle's statement that "not all the instruments of the senses extend to the brain" Galen exclaims: "Aristotle! What a thing to say! For my part, I am certainly ashamed even now to mention the subject" (VIII, 3; Helmreich, I, 451). He then proceeds to lecture Aristotle on the origin and location of the cranial nerves, rebuking him for mistaking the function of the brain and neglecting the rest of the nervous system, and concluding that "it is impossible to explain correctly the usefulness of any part without first finding out the action of the whole instrument. Let us, then, assume for the present discussion propositions demonstrated in other works of mine. I have shown in my book *On the Teachings of Hippocrates and Plato* that the source of the nerves, of all sensation, and of voluntary motion is the brain, and that the source of the arteries and of the innate heat is the heart" (VIII, 3; Helmreich, I, 453).

These, then, are some of the considerations which suggest that Galen's investigations of the brain and nervous system were of importance in leading him to adopt the Platonic view of man over that of Aristotle and other philosophers. However we may evaluate Plato's influence upon Galen, and Galen's own influence upon the history of medicine in the

<sup>28</sup> See, for example, III, 10 (Helmreich, I, 174), where Galen refers to *De usu* as "a true hymn of praise to our Maker. . . . I regard as proof of perfect goodness that one should will to order everything in the best possible way, not grudging benefits to any creature, and therefore we must praise him as good." Compare Plato, *Timaeus*, 29 D 7 ff.

centuries that followed, this much at least can be said: that his demonstrations, as the champion of Plato and Hippocrates against Aristotle, the Stoics, and others, established clearly and verifiably for future generations the brain as a source of sensation and motion and the nerves as their channels.<sup>29</sup> This was no small contribution to the basic knowledge of anatomy and physiology upon which modern medicine depends.

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<sup>29</sup> This is not to say that the brain was universally accepted as the center of consciousness after Galen. Two centuries later a well educated intellectual like St. Augustine of Hippo still assumes the heart as the center of life and consciousness. See his *Confessions*, passim.