

#### XIV. The Aetiology of Disease in Plato's *Timaeus*

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Modern scholars have, for the most part, entertained largely negative views as to the character of Plato's discussion of diseases in the *Timaeus* (82A–86A). The adequacy, seriousness, and significance of Plato's treatment have often been questioned.<sup>1</sup> Rivaud concluded that Plato's pathology of disease was rudimentary and incoherent compared to treatments contained in works of the Hippocratic *Corpus*, and that Plato, utilizing hypotheses from various earlier treatments of medicine, had failed to reconcile them in his account or to formulate a theory of his own.<sup>2</sup> Taylor also discovered inconsistencies and difficulties due to Plato's failure to integrate his sources and believed that Plato was simply following specialist authority, being influenced particularly by Philolaus and Philistion or other representatives of Pythagorean medicine.<sup>3</sup> While Cornford rejected the supposed influence of Philolaus, he likewise suggested Philistion as the origin for Plato of important medical doctrines, as well as Diocles of Carystus, who had, as he believed, also been influenced by Philistion.<sup>4</sup>

<sup>1</sup> As was done, indeed, by Galen, who criticized Plato's treatment at length, as a misinterpretation (due to Plato's lack of genuine medical knowledge) of the theory of disease contained in the *De natura hominis* of the Hippocratic *Corpus* (cf. Galen's *De placitis Hippocratis et Platonis* 7 and 8). In contrast, Plato's treatment was taken seriously by the Peripatetic Meno, if one may judge by the attention given to it in his history of medicine (cf. W. H. S. Jones, *The Medical Writings of Anonymus Londinensis*, [Cambridge 1947] 14.11 ff.).

<sup>2</sup> Cf. A. Rivaud, *Timaeus*, Budé Platon 10 (Paris 1925) 114–15, who considers the whole account a digression and is largely adverse in his criticism.

<sup>3</sup> Cf. A. E. Taylor, *A Commentary on Plato's Timaeus* (Oxford 1928), 587–610. Taylor's notes on the medical passage are frequently illuminating and valuable, but often vitiated, as is his approach to the *Timaeus* as a whole, by his desire to demonstrate that Plato's treatment embodies much Pythagorean doctrine of the fifth century. He emphasizes Philistion as a source (599, note 1) and concludes (608) that Plato's treatment represents a fusion of Pythagoras and Alcmaeon with Empedocles, and was probably deliberately based on actual syntheses of this kind attempted by fifth-century Italian or Sicilian teachers. This conclusion seems to me to be completely unacceptable. Taylor himself remarks, in fact, that the coincidences which he has noted between Plato's and other medical treatments are all in points of detail.

<sup>4</sup> F. M. Cornford, *Plato's Cosmology* (London 1937) 332–43. Cornford was working, of course, before the new dating of Diocles as a younger contemporary of Aristotle

Indeed, the general approach to Plato's treatment of disease by these and other scholars<sup>5</sup> has been largely through investigation of the possible sources of his doctrines, with comparatively little interpretation of his treatment as a whole and its relationship to the rest of the dialogue. The main impression resulting from this approach has been that Plato's treatment is merely derivative, eclectic and synthetic, and very largely lacking in coherence and significance. Such conclusions have, I suspect, done scarcely adequate justice to the intrinsic merits of the theory of disease presented in the *Timaeus*.

No one, of course, would maintain that Plato had any specialized or direct knowledge of his own in the field of medicine. On the contrary, it is undoubtedly true that any concrete or specific knowledge of medical phenomena and concepts encountered in his discussion of diseases must be derived from the investigations of others. It must be assumed, indeed, that Plato was familiar with the major medical and physical doctrines not only of his contemporaries but of earlier physicians and natural philosophers as well. It is possible, perhaps even likely, that Philistion was among the number of those physicians with whose work Plato was acquainted.<sup>6</sup> But, despite the doubtless large influence of contemporary and earlier medical and physical doctrines, evaluation of his treatment of disease as merely a synthesis of heterogeneous doctrines derived from other sources ignores the manner in which Plato utilized, elaborated, and transformed whatever he may have learned from others. Further, it disregards the fact that Plato's aetiology of disease seems to be complementary to and consistent

by Werner Jaeger, in his *Diokles von Karystos* (Berlin 1938) and was following the supposed relationship of Diocles and Plato with Philistion advanced by M. Wellman, *Die Fragmente der griechischen Aerzte* 1 (Berlin 1901) 65 ff. Wellman's account of Philistion's medicine and influence must now be much revised; in particular, Diocles cannot have influenced Plato (cf. Jaeger, *op. cit.*, 212) and any direct influence of Philistion upon Diocles becomes very dubious, especially if Jaeger's latest dating of Diocles to about 340–260 B.C. be accepted. For this latest dating, cf. Jaeger's *Vergessene Fragmente des Peripatetikers Diokles von Karystos*, *ABAW* 1938, Phil.-hist. Klasse 3, 1–46 (against later dating, cf. L. Edelstein, *AJP* 61 [1940] 483 ff.).

<sup>5</sup> Cf. Friedlaender, *Platon* 2 (Berlin 1930) 615–18, whose very brief discussion of Plato's sources yields results somewhat similar to those of other scholars. Whether one views Plato "als 'Synoptiker' oder als Eklektiker," Friedlaender concludes (617), will depend upon whether one judges his treatment of disease from the point of view of the history of medicine or of natural philosophy.

<sup>6</sup> Jaeger, in *Diokles von Karystos*, felt certain that Philistion was acquainted with Plato and visited the Academy (8 ff.), and that Philistion profoundly influenced Plato,

with physiological and physical principles established earlier in the dialogue. Indeed, Plato's essential concern is with the physical principles underlying the ultimate causation of disease.

Certainly, the conception of the *physis* of the body and the principles of physiology which Plato has earlier undertaken to explain are, in fact, vital to the understanding of the aetiology of disease presented in the *Timaeus*. Already, he has described the original generation of the tissues of the body in terms of their elementary composition and teleological implications,<sup>7</sup> and then has proceeded to explain in some detail the major physiological processes, respiration and digestion, as the basis of the nutrition, growth, maintenance, and decay of the body.<sup>8</sup> The explanation of all these processes has been articulated essentially in terms of the four elements and their triangles composing the constitution of the body *kata physin*, and of the motions and changes which those elementary particles undergo. For, because of the constant attack of the elements upon the body from outside, there is a continual *kenôsis* and *apochôrêsis* of the elements from the body, which must be compensated by a complementary *plêrôsis* of the body by the elements in the process of nutrition. These processes, along with their consequent *phora* and *alloiôsis* of the elements within the body, must ideally be maintained in equilibrium, if the natural and regular constitution of the elements in the body is to be preserved unharmed.<sup>9</sup> This principle of constant change and flux which profoundly characterizes the ἐπίρρυτον σῶμα καὶ ἀπόρρυτον of man,<sup>10</sup> as well as all else in the phenomenal world, is Plato's deepest apprehension of the nature of the body;<sup>11</sup> and

and Aristotle and the Lyceum as well (212 ff.). There is some evidence to support these views, though it is far from conclusive. I suspect that Jaeger overestimated Philistion's influence and that there were many others besides Philistion who adapted and transmitted the basic doctrines of Alcmaeon and Empedocles, whose physical principles had so pervasive an influence upon later Greek medicine, as various works of Hippocratic *Corpus* demonstrate.

<sup>7</sup> Cf. 73B ff. On this subject and the probable Empedoclean background, cf. F. Solmsen, "Tissues of the Soul," *Phil. Rev.* 59 (1950) 435 ff., especially 445-54.

<sup>8</sup> Cf. 77A-81E.

<sup>9</sup> On the processes of *kenôsis* and *plêrôsis* as they affect the body, cf. especially 80D-81B, and earlier, 77A. The conception underlies also the description of the formation of the Cosmos, 32C-33A.

<sup>10</sup> As Plato earlier describes the body of man, in 43A, 5, where he develops the conception in mythical terms at length (43A-44A).

<sup>11</sup> On this subject, cf. my paper "The Flux of the Body in Plato's *Timaeus*," *TAPA* 88 (1957) 103 ff.

it is quite logically the foundation upon which he proceeds to explain the causation of disease.

The origin of disease, Plato begins, is doubtless clear to everyone.<sup>12</sup> Since the body is compacted of four kinds (*genôn*) or elements: earth, fire, water, and air, the excess (*pleonexia*) or the deficiency *para physin* of any one of the elements, or the *metastasis* of an element from its own proper place to an alien place *para physin*, or, again, because fire and the other elements are of more than one variety,<sup>13</sup> the body's receiving any variety that is not suitable to it, then these and all such irregular actions or states furnish disorders (*staseis*)<sup>14</sup> and illnesses in the body. For, he continues, whenever any element comes into being (*gignomenou*) in the body or changes its place in the body (*methistamenou*) *para physin*, all that was previously cool in the body becomes heated, and that which was dry later becomes moist, what was light becomes heavy and the heavy light,<sup>15</sup> and the body suffers all changes of every kind.<sup>16</sup> In this passage, Plato analyzes the ultimate causation of disease of the body in terms of the possible

<sup>12</sup> 82A ff. The remark must surely be made with close reference to his earlier description of the *physis* and especially the physiological processes described in 80D-81E.

<sup>13</sup> For Plato's description of the varieties of the primary elements, cf. 57c, 6-D, 7 and 58c, 5.

<sup>14</sup> In this account, *pleonexia* and *staseis* are specially Platonic terms. For other uses of *pleonexia* in medical contexts, cf. *Symp.* 188B and *Laws* 906c. For *stasis*, cf. *Soph.* 228A-B and *Rep.* 444B ff. The conception of disease reflected in the two latter passages is in principle the same as that of *Timaeus*. Cf. especially the definition of health and disease in *Rep.* 444D ff.

<sup>15</sup> The effects upon the body of the *unnatural* condition or change of the elements is described with reference to the qualities or properties of the several elements, for Plato's explanation of which. cf. 61D, 5 ff.

<sup>16</sup> Several commentators suggest the influence here of Philistion on Plato's conception of the origin of disease, though curiously Taylor (above, note 3) does not. There is some general similarity, though Philistion's explanation, so far as it can now be known, is simpler: according to *Anonymus Londinensis* 20.25 ff., Philistion, who was doubtless following the tradition of Empedocles, taught that the body was composed of four forms (*ideôn*), i.e., the elements of fire, air, water, and earth. Each element has its own *dynamis*; of fire the *dynamis* is the hot, of air the cold, of water the moist, of earth the dry. The elements are causes of disease when the hot and the moist are in excess, or when the hot becomes deficient and weak. It should be noted that Philistion's conception seems to depend upon the elements, of which the *dynamis* are properties. On the other hand, Taylor suggests the general influence of Alcmaeon here (cf. also Friedlander [above, note 5] 616). It is, of course, true that Alcmaeon's conception (for which cf. Diels-Kranz, *Vors.* 24 B 4) of the *isonomia* and the *symmetros krasis* of the many pairs of opposite *dynamis* as the basis of health, the *monarchia* of any *dynamis* causing disease, underwent many developments and adaptations and, in changed forms, pervaded deeply much of later medical thought.

irregularities of the elements of the body, and their properties, motions, and effects—a causation which would be fully intelligible only in the light of the earlier conception of the constitution (*systasis*) and order (*taxis*) of the elements composing the body *kata physin*. Hence, any alteration of the nature or position of any element *para physin* must necessarily cause disorder within the body.

Further, the immediate causation of the possible irregularity of the constitution of the elements of the body has already been provided by Plato in connection with the doctrine of *kenōsis* and *plērōsis*. The general principle and the specific ways in which the body is affected in accordance with this doctrine, which is clearly assumed here, is conveniently summed up in simple terms in a later statement (88D, 1–5): τοῦ . . . σώματος ὑπὸ τῶν εἰσιόντων καομένου τε ἐντὸς καὶ ψυχομένου καὶ πάλιν ὑπὸ τῶν ἔξωθεν ξηραίνομένου καὶ ὑγραινομένου καὶ τὰ τούτοις, ἀκόλουθα πάσχοντος ὑπ’ ἀμφοτέρων τῶν κινήσεων . . . Man therefore lives constantly subject to internal and external influences which may induce alteration of the constitution of the elements and their motions in the body, with consequent disorder and disease. This is Plato’s basic conception of the cause of disease, and its importance may be seen from the care with which he has described the possible irregularities of the elements in the body, and particularly from the precision with which he immediately proceeds to enunciate the principle of health:<sup>17</sup> μόνως γὰρ δὴ, φαμέν, ταῦτ’ ὅντα κατὰ ταῦτ’ ὡσαύτως καὶ ἀνὰ λόγον προσγιγνόμενον καὶ ἀπογιγνόμενον ἔσσει ταῦτ’ ὅντα ὃν αὐτῷ σῶν καὶ ὑγιὲς μένειν. Plato has here formulated, with extreme emphasis, the necessity of the preservation of the regularity and uniformity of the elements and their motions as the fundamental basis of health. For only in accordance with this principle may the stability of the *physis* be maintained. The violation of this principle naturally embodies the basic principle of illness, as he concludes: ὁ δ’ ἂν πλημμελήσῃ τι τούτων ἐκτὸς ἀπὸν ἢ προσίον, will cause alterations of every kind and consequent illnesses and corruption. This fundamental conception of the causation of the health and illness of the body

<sup>17</sup> Cf. 82B, 2 ff. The conception of this principle and its formulation on the basis of the elements composing the *taxis* of the body harmonizes completely with physical principles advanced earlier in the dialogue. Underlying this principle and its implications is doubtless the general principle of Rest and Motion which Plato has explained (57D, 7–58A, 2) as resulting from the homogeneity and heterogeneity respectively of the elements.

is basic to Plato's entire treatment of diseases, underlying also the explanation of the second and third classes of disease. It should be remarked that the emphasis so far is wholly upon the establishment of this principle, and that he does not here name or illustrate specific illnesses arising from the disorder of the elements in the body.<sup>18</sup> His procedure indicates, surely, that he is attempting to understand the ultimate causation of health and disease, and that his approach to the explanation of disease is that of the natural philosopher, not that of the physician directly concerned with treatment.

The principle which Plato has formulated so precisely and stated so forcefully is now applied more narrowly and specifically to the most basic physiological processes of the body (82c ff.). Since the secondary structures or tissues of the body have been composed *kata physin*,<sup>19</sup> there is a second consideration (*katanoësis*) of diseases to be comprehended. Since marrow, bone, flesh, and sinew have been composed of the primary elements already mentioned (*ex ekeinôn*), and blood also is composed from the same elements but in a different manner,<sup>20</sup> of the remaining diseases most occur in the same fashion as those already explained, but the gravest diseases occur in the following manner. Whenever the generation (*genesis*)<sup>21</sup> of the tissues proceeds backwards (*anapalin*), then those tissues are corrupted. For, *kata physin* flesh and sinews arise from blood, sinew from the fibrin of the blood and flesh from the defibrinated and coagulated blood. In turn, the viscous, oily substance arising (*apion*) from flesh and sinew glues the flesh to the bone and, at the same time, nourishes and increases the bony substance around the marrow; again, of the viscous, oily substance, the purest kind (*genos*) of the triangles, being oily and smooth, strain through the dense structure of bone

<sup>18</sup> In fact, the only illustration comes at the end of his whole discussion of disease, in his explanation of fevers (86A). The two factors of causation involved are the excess of the various elements and the periodicity of fevers depending upon the varying mobility of the several elements. On this mobility, cf. 55E, 1-3 and 56A ff.

<sup>19</sup> As Plato writes: δευτέρων δὲ συστάσεων αὐτὰ κατὰ φύσιν συνεστηκυῶν . . . , with reference to the original formation of the tissues (cf. above, note 8).

<sup>20</sup> Cf. 80D-E ff., for Plato's account of the formation of the blood, which consists of the elementary particles and their triangles resulting from the action of the internal fire upon the ingested food and drink.

<sup>21</sup> The word *genesis* must mean the continuing nourishing and maintenance of the tissues after full growth is reached, as well as the generation of the tissues during growth. Because of the constant *kenôsis* and *plêrôsis* of the body, the tissues are in a sense always being "generated."

and thus water (*ardei*,<sup>22</sup> i.e. nourish) the marrow. And Plato concludes: καὶ κατὰ ταῦτα μὲν ἐκάστων γιγνομένων, ὑγίεια, συμβαίνει τὰ πολλά· νόσοι δέ, ὅταν ἐναντίως (82E, 1). The conception underlying this description of the causation of disease involving the tissues is clearly that of the continuous generation and nourishing of the several tissues, each of which is composed of a definite *systasis* of the elements, by means of the elements and their triangles which compose the blood, in a regular order and process which is fixed *kata physin*. The idea of *taxis* is fundamental to the entire conception.

Plato then attempts to describe the consequences of this reversal of generation and nourishment, by the blood, of the several tissues (82E, 2 ff.). First, whenever flesh<sup>23</sup> is dissolved and decomposed (*tékomenê*), it discharges the decomposed substance back again into the veins; thus the blood along with the *pneuma* in the veins, becoming increased in quantity and altered by colors and bitter substances, as well as by sharp and saline properties (*dynamis*), comes to contain all kinds of bile, serum, and phlegm. This statement is in explanation of the origin in the body of the noxious humors, whose formation is the primary consequence of the decomposition of flesh. The major result of this formation of the humors now follows (82E, 7 ff.): whenever the substances (i.e., the elements etc. which previously composed flesh *kata physin*) have become reversed (*palinaireta*) and corrupted, they first destroy the blood itself, and no longer themselves furnishing any nourishment to the body, are borne everywhere through the veins, τάξιν τῶν κατὰ φύσιν οὐκετ' ἴσχοντα περιόδων, ἐχθρὰ μὲν αὐτὰ αὐτοῖς διὰ τὸ μηδεμίαν ἀπόλαυσιν ἑαυτῶν ἔχειν, τῷ συνεστῶτι δὲ τοῦ σώματος καὶ μένοντι κατὰ χώραν πολέμια, διολλύντα καὶ τήκοντα. The final result, therefore, of the reversal of the generation of flesh, with its consequent decomposition and corruption of blood, is the disorder caused in the *systasis* and *taxis* of the bodily processes. With its metaphorical language,<sup>24</sup> the passage

<sup>22</sup> For the word and image, cf. 77c, 6 ff. and 78E.

<sup>23</sup> In 74c, 5-D, 2, the composition of flesh has been described as a mixture of water, fire, and earth, along with a ferment of acid and saline.

<sup>24</sup> The metaphor uses the old conception of the "strife" of the elements (or of the "opposites" or the *dynamis*) which recurs often in early Greek thought in various forms. The same metaphor underlies the earlier description in the *Timaeus* of the cosmic strife of the elements and their transformation, which continues until each element is separated, by its movement of "like to like," to its own place and kindred

illustrates vividly the profound consequences of the violation of the principle of the natural order and regularity of the constituent elements and their motions, as it applies to the tissues.

Only a brief general explanation of the origin of the noxious humors from the decomposition of flesh has so far been presented. After his description of the effects of the decomposition of flesh upon the blood, Plato therefore proceeds to a fuller description of the humors (83A, 5-E, 1). He presents, in effect, a classification<sup>25</sup> of the several kinds of bile, serum, and phlegm, and attempts to indicate in some detail the specific origin, colors, and major characteristics of each kind and species of humor. At the end of this discussion he sums up (83E, 2): all these humors become agents (*organa*) of disease, *ὅταν αἷμα μὴ ἐκ τῶν σιτίων καὶ ποτῶν πληθύσῃ κατὰ φύσιν, ἀλλ' ἐξ ἐναντίων τὸν ὄγκον παρὰ τοὺς τῆς φύσεως λαμβάνη νόμους*.

The argument is now extended from the decomposition of flesh and applied *seriatim* to the other tissues (83E, 5 ff.). When flesh is being disintegrated by the agency of disease, so long as the roots of the tissue remain unharmed, the power of the attack is diminished and offers ready recovery. But whenever disease attacks that substance which binds flesh to bone, and the substance no longer furnishes nourishment to bone or binds flesh to bone, but becomes harsh and saline, being dried out by bad diet, then that tissue crumbles back into flesh, while flesh in turn, leaving its roots, falls back again into the circulation (*phoran*) of the blood, thus making the diseases already described worse. Still more serious sufferings arise (84B, 4 ff.) whenever bone, because of the denseness of flesh, does not receive adequate *pneuma* or ventilation (*anaφnoên*); becoming heated then, it decays and does not accept its nourishment. Thus, bone decomposes and is discharged back into its nourishment,<sup>26</sup> in turn the nourishment is discharged again into flesh, and flesh, decomposing, falls back into the blood, making the disease harsher than before. Lastly, in the extreme case (84C, 4 ff.), the most deadly of diseases arises *ὅταν ἡ τοῦ*

(56D-57C, 6). It is similarly reflected in Plato's discussion of the origin of disease (82A) and will recur below.

<sup>25</sup> On the nature of this classification of the humors into *genos* and *eidê*, cf. Plato's remarks in 83C. He is using, it would seem, his own principle of *diaeresis*.

<sup>26</sup> "Nourishment" here refers to that tissue which, derived from flesh and sinew, nourishes bone and binds flesh to bone.



μυελου φύσις ἀπ' ἐνδείας ἢ τινος ὑπερβολῆς νοσήσῃ . . . πάσης ἀνάπαλιν τῆς τοῦ σώματος φύσεως ἐξ ἀνάγκης ρυείσης.<sup>27</sup>

Throughout this entire analysis of the diseases of the secondary structures of the body, Plato's explanation of the causation assumes the basic principle of the health and stability of the body already elaborated. It is on this foundation that the generation and nourishment of the tissues is conceived and visualized. This conception embraces the regular and uniform generation of the tissues *kata physin* by the blood, i.e., by the elementary particles and triangles composing the blood,<sup>28</sup> if the natural structure of the tissue is to be preserved unaltered and healthy. At any stage in this sequential process, there may occur some failure in the regular and natural process of nourishment, thus causing "disorder" in the structure of the tissue.<sup>29</sup> This decomposition necessitates the "falling back" of the decomposed substance of the tissue into the previous tissue, and finally into the blood, hence producing the humors and causing the *ataxia* of the circulation of the blood, and thereby interfering with the process of *plêrôsis*. This reversal of the generation and nourishment of the tissues becomes total when the marrow becomes "disordered" through some excess or deficiency—all the *physis* of the body then, of necessity, flowing backwards. This would represent, for Plato, total inversion of the principle of health.

In his analysis of the diseases of the secondary structures of the

<sup>27</sup> In the original formation of the tissues (cf. 73B, 1-c, 2), not only was the generation of the marrow the *archê* for all the other tissues, but it was composed of the primary triangles of fire, water, air and earth mixed symmetrically. In 82D, 5-7, the nourishment of the marrow by the purest kind of triangles has already been emphasized. Hence the possible "disorder" and decomposition of the marrow by the excess or deficiency of the triangles in the process of nutrition is easy to conceive. The word *ρυείσης*, recalls the image of the "stream" of the body as developed in 42E, 4-43D, 3.

<sup>28</sup> 80D-81C gives Plato's explanation of the process of the nourishment of the body by the blood and its constituent elements and triangles, according to the principles of *kenôsis* and *plêrôsis* and of motion "like to like."

<sup>29</sup> The immediate cause of decomposition is, expressed simply, the failure of the blood (for whatever reason) to furnish the proper nourishment to the several tissues; in terms of Plato's physical principles, it is the failure of the blood, composed of the elementary particles and triangles, to supply, in accordance with *plêrôsis*, exactly the proper elements needed to preserve *kata physin* the original structure of the tissue (each tissue being composed of the several elements or triangles or substances in definite proportions, though the proportion is symmetrical only in marrow). This failure would cause some excess, deficiency, or dislocation etc. of the elements *para physin*, hence the disorder and dissolution of the tissue.

body, Plato has attempted to explain the origin and to describe the nature of the humors, but has discussed them only so far as they may interfere with the function of the blood. It is, then, logical for him to proceed (84c ff.) in an account of a third form (*eidos*) or class of diseases, to analyze phlegm and bile as they act as agents of disease, introducing this account with an analysis of *pneuma* as a possible cause of disease. In this third class, Plato is concerned mainly with diseases affecting various organs or parts, or with the body as a whole, rather than those involving the elements or the tissues of the body. Yet it is still the conception of the *taxis* of the body and its parts, and their orderly functioning, which is essential to his explanations.

Air, or *pneuma*, is obviously an element of especial importance to the functioning and well-being of the body, and Plato has earlier in the *Timaeus* spent much effort in attempting to describe the entire process of respiration.<sup>30</sup> His explanation of air as a cause of disease depends upon the disruption of the regular supplying of *pneuma* throughout the body. Whenever the passageways of the lungs, the steward (*tamias*) of *pneuma* for the body, are blocked by rheums, the *pneuma*, not entering some parts of the body, causes putrefaction of those parts through the failure of "cooling" (*anapsychês*) accomplished by respiration; but entering into other parts more than suitable, the *pneuma*, distorting the veins and decomposing the body, is cut off and enclosed within the middle of the body, thus causing painful maladies. Again, when flesh is decomposed in the body, *pneuma*, being collected and not able to pass outside the body, causes the same pains as *pneuma* entering the body from outside.<sup>31</sup> In this account, it is the failure of the natural functioning of respiration and the consequent excess of deficiency of *pneuma* which produces disorders in the body and its parts.

<sup>30</sup> Cf. 78E-79E. Plato's explanation of respiration as taking place through the "pores" of the skin as well as through mouth and nose doubtless follows the conception of Empedocles (cf. *Vors.* 7 B 100), and of others of the Empedoclean tradition, including Philistion, according to *Anonymus Londinensis* 20.42 ff. (the recent attempt of N. R. Booth, in *JHS* 80 [1960] 10-15, to show that Empedocles did not teach that breathing took place through the "pores" of the skin seems very dubious).

<sup>31</sup> As L. Edelstein has pointed out (*AJP* 61 [1940] 224-25), *pneuma* may be a cause of illness only in connection with some other substance, with the *rheumata* arising from phlegm, or with phlegm or bile resulting from the disintegration of flesh. *Pneuma* is therefore logically included with phlegm and bile in the discussion of the causation of the third *eidos* of disease.

As humors originating *para physin*, phlegm and bile have no natural function in the structures and processes of the body. Hence, Plato's general conception is that these humors, unless they are purged with comparatively minor effects upon the body, cause disorder and disease in whatever parts of the body they may chance to attack. Besides other specific pathological effects of the two species of phlegm, one disease involving white phlegm is of especial interest to Plato (85A-B). When white phlegm is mingled with black bile and is dispersed over τὰς περιόδους τε τὰς ἐν τῇ κεφαλῇ θειοτάτας οὔσας and causes great disturbance in them, this disease, being a disease of the ἱερᾶς . . . φύσεως, is justly called "sacred." A somewhat similar causation is utilized a little later to explain the bodily basis of some diseases of the soul. When the humors of sharp and saline phlegms and bitter and bilious humors, Plato writes (85E, 5-87A), wander through the body and obtain no outlet from it, then these humors, mingling their vapors with the motion (*phora*) of the soul, engender diseases of many kinds.

The causation of diseases arising from bile, due to its hot and burning nature, is analyzed at some length and with much care by Plato (85B, 6-86A). In addition to effects resulting from the purging of bile from the body, bile produces many burning (*pyrikauta*) diseases when it is enclosed within the body. The greatest of these results when bile is mixed with pure blood and, therefore, τὸ τῶν ἰνῶν γένος ἐκ τῆς ἑαυτῶν διαφορῇ τάξεως. Fibrin, Plato explains, is spread through the blood, in order that the blood may maintain the properties of thinness and thickness in proportion (*symmetrôs*), and, thus, may neither, becoming too liquid through heat, flow readily from the loose texture of the body, nor, becoming thicker and sluggish, move with difficulty through the veins. It is the fibrin which, τῇ τῆς φύσεως γενέσει, guards the right proportion (*kairon*) of these properties of blood.<sup>32</sup> Since fibrin has this property (*dynamis*) of acting in blood, the hot and moist bile, falling into the blood slowly at first, is congealed by the *dynamis* of fibrin, and thus causes coldness within. When, however, the bile flows into the blood in greater quantity, because of its natural heat it overwhelms the fibrin and therefore εἰς ἀταξίαν ζέσασα διέσεισε. If the hot bile is sufficient to prevail

<sup>32</sup> The teleological conception involved in Plato's explanation of the nature and action of fibrin in this passage is notable.

over the fibrin to the end, thereafter piercing through to the substance of the marrow and burning, it loosens thence the bonds of the soul, as it were of a ship,<sup>33</sup> and releases it. When the bile is of lesser quantity and the body thus escapes decomposition, then the bile itself is overwhelmed and is either purged through all the body or, after being thrust through the veins in to the upper or the lower belly, is driven from the body just as *φυγὰς ἐκ πόλεως στασιασάσης*, thus causing diarrhea, dysentery, and other such diseases.

Thus Plato concludes his explanation of the diseases of the body, an explanation which emphasizes constantly the primary physical cause of disease in terms of the constituent elements of the *physis* of man. Careful analysis of his examination of causation reveals, I think, a theory of causation penetrating deeply into the physical nature of the body and utilizing logically and with considerable consistency those principles and concepts described earlier in the *Timaeus* as operative in the World of Becoming. Underlying the whole theory of causation is the conception of the natural *systasis* and *taxis* of the primary elements and the tissues of the body, and the principle of the regularity and uniformity of the motions of the constituent elements in the flux and change of the body, if health is to be preserved. Plato's approach to the seemingly disparate and complex phenomena of disease is essentially on the level of physics.

The basic principle upon which Plato has elaborated his aetiology of disease is once again reflected, simply but with unusual clarity, when he discusses the remedying of bodily diseases by gymnastic exercise. He had just previously emphasized the necessity of maintaining symmetry and proportion between soul and body by exercising both equally, with motions appropriate to both. The body and its parts also, he continues (88c, 7 ff.), must be treated in the same manner, always *τὸ τοῦ παντὸς ἀπομιμούμενον*.<sup>34</sup> Since the body is burned and chilled within by the substances entering into it, and, again, is dried out and moistened by the elements from outside, and consequently suffers

<sup>33</sup> For the same image, cf. earlier 73b, 5 ff. and 81d, 5 ff. In the latter passage, the image is used in description of the cause of natural death.

<sup>34</sup> The entire passage develops very fully the microcosm-macrocosm analogy, which is, of course, found also in Plato's description of other aspects of the body and the principles of physiology. Cf. especially the account of the process of nutrition in 81A-B.

the changes following upon both these kinds of motions (*kinêseôn*), whenever one surrenders the body, continuing at rest, to these motions, it is overpowered and destroyed. But if one, in imitation of the Nurse and Nurturer of the All, never permits the body to continue in a state of rest, but, by moving it and by constantly causing vibrations (*seismous*) in it, τὰς ἐντὸς καὶ ἐκτὸς ἀμύνηται κατὰ φύσιν κινήσεις, καὶ μετρίως σείων τὰ τε περὶ τὸ σῶμα πλανώμενα παθήματα καὶ μέρη κατὰ συγγενείας εἰς τάξιν κατακοσμήη πρὸς ἄλληλα, he will not permit enemy to be placed beside enemy to engender in the body wars (*polemous*) and disease, but friend beside friend, producing health.<sup>35</sup> And, Plato adds, as to motions, the best is that motion produced in the body itself by itself, since such motion is especially kindred (*syngenes*) to the motion of intellect and the motion of the All. Throughout this explanation, Plato utilizes once again the principle which he had carefully elaborated to explain the origin of disease.

<sup>35</sup> Cf. 88E ff. In accordance, Plato adds, with the account of the All previously given, i.e., with the movement and separation of the elements to their own kind, caused by the motion of the Receptacle, as described in 52D–53A.