Section of the History of Medicine.

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Erasistratus.

By J. F. DOBSON, M.A.

(I) INTRODUCTION.

PRECISE dates in the life of Erasistratus cannot be ascertained. Tradition points to the conclusion that he was living and working in Alexandria at about the same time as Herophilus, of whom perhaps he was a slightly younger contemporary. This would place him in the first half of the third century B.C. We have the titles of many of his works. The writings themselves are lost; even to Galen (died A.D. 201), from whom we draw most of our information concerning Erasistratus, only extracts were accessible.[1]

Like Herophilus, Erasistratus divided his time between professional practice and research, and like him was interested particularly both in anatomy and physiology. But while Herophilus, in addition to a wide general knowledge of medicine, had a particular bent for anatomy, the trend of the researches of Erasistratus leads us to class him primarily as a physiologist. A noticeable feature of his work was an attempt at scientific consistency. His earlier studies had brought him into contact with the Peripatetics; indeed tradition represents him as working at one time under Theophrastus (*c.* 372-287 B.C.), himself the pupil of Aristotle. In this school he may have been introduced to the physical theory of Democritus (*c.* 400 B.C.). Erasistratus accepted in general the atomic theory that is associated with the name of Democritus, but modified it in a manner peculiar to himself. He attempted, not without success, to harmonize it with his physiological system. Democritus had hypothecated a continuous void or vacuum but Erasistratus assumes a discontinuous vacuum. He believes in the existence of innumerable minute empty spaces interspersed with the atoms in the human body. Observing the continued subdivision of certain vessels, he argues that they must eventually decrease in size beyond the limits of human vision.

Philosophically, Erasistratus has an objection to hidden causes, the only one which he admits being what he calls *Physis*, which we may here translate *Nature*. He could not wholly dismiss a creative force, but he attempted to reduce her activities to this simple term. In contrast to his contemporaries who explained certain bodily activities by the ὁλκή (attractive power) of the organs, Erasistratus brings into play the assumed tendency of Nature to fill a void—*ἀκολουθία πρὸς τὸ κενούμενον*—which we may represent by *horror vacui*. This doctrine was held in opposition to that of Empedocles (*c.* 500 B.C.), who claimed that "Love and Hate," i.e., attractive and repulsive forces, were responsible for the formation of the universe.

I shall endeavour to put together such fragments as set forth the biological views and discoveries of Erasistratus. These may be considered under two headings, first as to the growth and structure of the organs, and secondly as to their functions. The discussion of these will be followed by an account of the teaching of Erasistratus on pathology, on the humoral theory and on practical medicine.

1 So in the opinion of Allbutt, *Greek Medicine in Rome*, London, 1921.

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(II) Growth and Structure.

Nowadays all men of science and many who cannot claim that proud title are familiar with the word *metabolism*.[1] In the fourth century B.C., not only the term, but its connotation, were unrecognized. Yet Erasistratus evidently had some inkling of the process. The exact words which he used to describe the process are unknown, but Galen has preserved for us his own representation of the teaching of Erasistratus, which he endeavours to represent in as ridiculous a light as possible. Nevertheless we can see dimly through Galen's quotations something of the real Erasistratus.

Galen II, 87.[2]—"The heart is at first no larger than a millet seed, or, if you like, a bean. Ask yourself how it could grow large otherwise than by being distended and receiving nutriment throughout its whole extent, just as we have shown above that the seed is nourished. But even this is unknown to Erasistratus, who makes so much of Nature's art. He supposes that animals grow just like a sieve, a rope, a bag, or a basket, each of which grows by the addition to it of materials similar to those out of which it began to be made."

To add a mesh to a net, or a fresh row to a knitted bag, seems to me a fitting metaphor to describe the accretion of new cells on an already existing cell. Though our physiologist, living before the age of microscopes, could have had no knowledge of cellular tissue, I imagine that he was led to his theory by observation of some such phenomenon as the growth of the bulb of a monocotyledon such as that of his native asphodel, a word which, being transformed, has become our daffodil.

As there is a natural tendency to growth, so there is, in the course of nature, a constant wastage. This takes place partly by visible means, e.g., by the various known forms of atttrition and excretion, partly by imperceptible processes only cognizable by reason.

"To repair the waste, Nature, according to Erasistratus, has provided mechanism in the form of instincts or appetites (*ορέξεις*), substances (*ὑλαί*) and forces (*δυνάμεις*). The chief of the last named is the power of the *pneuma*, which transmutes the nourishment into a form suitable for supplying the place of the matter carried off (*εἰς ἀναπλήρωσιν τῶν ἀποφερομένων*)."[3] This recalls the doctrine of Heraclitus of the constant flux and transmutation of one subject into another.

Erasistratus was among the first to recognize the division of the nerves as motor and sensory, though the discovery is sometimes claimed for Herophilus.

It was Erasistratus who first derived the sensory nerves, which he regarded as hollow, from the meninges, the motor nerves from the brain and cerebellum. Later, however, he traced all nerves to the brain,[4] which, he says, appears to be the origin of the bodily functions, for the perforations of the nostrils and the ears were found to be connected with the brain, and processes from the brain lead also to the tongue and the eyes.[5] "He also," says Galen, "wrote accurately about its four ventricles."[6]

Erasistratus described the *vasa chylifera* of the mesentery,[7] but cannot have all the credit for their discovery, as Herophilus had probably preceded him in distinguishing from the veins of the mesentery certain vessels ending in glands.[8] He certainly did not understand their function, but thought them to be a kind of artery

1 The term was, in fact, invented and introduced by Th. Schwann, the pioneer of the cell theory, less than a hundred years ago.

2 This and all other references to Galen are given to Kühn's edition.

3 *Gal.* II, 105.

4 *Gal.* V, 603.

5 Herophilus derived some of the motor nerves from the brain and the spinal marrow—*Rufus*, ed. Daremberg, p. 164.

6 *Gal.* V, 602.

7 *Gal.* II, 648.

8 *Proc. Roy. Soc. Med.*, 1925, xviii (Sect. Hist. Med.), 21.

containing first *pneuma* and then *chylos*. Erasistratus is said to have first observed them when dissecting new-born kids.

Herophilus had made some comparisons of the organs of man with those of certain animals. Erasistratus extended these comparative studies to the brain. He observed that the surface of this organ presented greater complexity in man. This greater complexity, he inferred, was the reason of man's superiority in intelligence over the brute creation in general.[1] He described the brain with more accuracy than Herophilus,[2] noticing not only the two lateral ventricles and the third ventricle, but also the fourth ventricle under the cerebellum, communicating with the third.[3]

Perhaps the greatest contribution of Erasistratus to Anatomy was his appreciation of the nature of bodily tissue, implied in the following passages:—

"He says that the coats of the arteries and generally of all parts of the creature are a tissue of (*πεπλέχθαι ἐκ*) vein, artery and nerve, and each part is nourished by the vein contained in it, namely, the simple vein apprehensible by reason (*λόγῳ θεωρητῆς*)."[4]

And again, "The nerve contains veins and arteries in itself like a rope formed by plaiting three strands of different kind."[5]

He did not, however, push this theory to extremes, and for want of a better explanation he described certain parts of the body as being a "deposit of nutriment" (*παρέγχυμα τροφῆς*), classifying under this head the brain, marrow, liver, and spleen.[6]

In knowledge of structure of the lungs and the digestive organs it does not appear that Erasistratus made any advance on his predecessors. He was content to take the current accounts of them and to investigate rather their functions than their conformation.

(III) Bodily Functions.

We shall now consider the chief processes by which life is supported in the animal.

(*a*) *Digestion.*

With regard to digestion Erasistratus was a reactionary. The majority of his contemporaries considered the process to be akin to cooking or coction (*πέψις*), the chief or only agent being the "innate heat" of the body. He entirely rejected this theory,[7] and preferred to make it for the most part a mechanical process. The food, he believed, is ground by the muscular action of the stomach itself—a peristaltic movement of the muscular coat helped by the *pneuma*[8] which has entered the stomach through the arteries, and not with the food itself, as was believed by his Athenian predecessor, Diokles of Karystos (*fl. c.* 350 B.C.). It is interesting to observe that an exactly similar controversy took place among the physiologists of the seventeenth and eighteenth centuries.

It would seem that in the view of Erasistratus the function of the *pneuma* is here entirely mechanical. Probably it only serves in some way to originate the motion, for Erasistratus criticized the opinion of Pleistonikos and Diokles that the *pneuma* sets up a kind of fermentation or decomposition of the food in the stomach.[9] His remark that fever produces indigestion because the energy of the *pneuma* is then impeded, is consistent with this view.

1 *Gal.* III, 673. 2 *Gal.* III, 666. 3 *Gal.* V, 602.
4 *Gal.* III, 538. 5 *Gal.* II, 96.
6 *Gal.* XIV, 697. Galen, after repeating the theories about the *τριπλοκία* (triplicity of vessels) and *παρέγχυμα*, says that neither of them will account for the structure of bone.
7 He considered the bodily heat insufficient to "boil" the food—*Gal.* XV, 247.
8 *Ibid.* and cf. XIX, 372; II, 119, 120.
9 *Gal.* II, 111; II, 166.

When the trituration is complete, the *chylos* is passed on from the stomach and intestines to the liver, where, by some unexplained process, it is transformed into blood.[1] Pure blood passes thence to the heart through the *vena cava*. At every *diastole* the biliary constituents are separated off and pass to the bile-duct,[2] any stoppage of which produces jaundice.[3] The blood passes from the heart through the pulmonary vein to the lungs.

(*b*) *Respiration.*

Digestion then is partly due to the *pneuma*, the earlier history of which must be now considered.

Erasistratus is quite clear (in opposition to the author of the Aristotelian *De spiritu* and others) that there is no innate breath in the body—the *pneuma* is *ἐπικτητόν*, i.e., derived from outside. Actually we hear that it is drawn, in the process of inhalation, from the outside air by the nose and mouth. It passes by the *bronchi* (*πρῶται ἀρτήριαι*) to the lungs; and thence through the pulmonary vein to the left ventricle of the heart,[4] and thence further by the *arteria ascendens* and *arteria descendens* to the brain and to the whole body. The process by which the *zotic pneuma* ("vital spirit" of later writers) of the heart becomes *psychic pneuma* ("animal spirit" of later writers) in the brain remains a mystery.[5]

The *pneuma* inhaled must have a certain density for otherwise suffocation would ensue. He instances cases of suffocation due to the inhalation of the vapour produced by pouring water on glowing cinders, i.e., by carbon monoxide.[6] It is the entry of *pneuma* into the muscles that causes them to expand. For this it must have sufficient density, for if too fine it would presumably escape through pores.[7] The *pneuma*, like the blood, can only flow one way; the bicuspid valves prevent it from returning from the heart into the lung; the sigmoid valves of the aorta prevent its return into the heart.[8]

(*c*) *Vascular System.*

The aorta, Erasistratus considered, divides into arteries, which again divide and subdivide beyond the limits of vision. Veins and nerves are similarly divided, and every organ is built up of a system, or rather network, of vein, artery, and nerve. These minute tubes "plaited together" form tissue. Through these tubes—for the nerves also are tubes—blood, essential for nourishment, and *pneuma*, of two kinds, necessary for motion and sensation, are conveyed to every part.

We have referred above, under the headings (*a*) *Digestion* and (*b*) *Respiration*, to the motion of the blood from liver to heart and thence to lungs, and, presumably, by various veins from the heart to other organs; and also to the motion of the *pneuma* from lungs to heart and thence through the *aorta* to various arteries and so to the organs. The left and right cardiac ventricles, the repositories of *pneuma* and blood respectively, are quite separate, so that there is no communication between veins and arteries in the heart. At the other end of the vascular system both pneuma and blood have been used up by the processes of nutrition or voided by excretion, so that there is nothing left to be returned to the heart.[9]

It is generally stated (e.g. by Allbutt,[10] Singer[11] and others) that Erasistratus came near to anticipating Harvey's discovery of the circulation of the blood by eighteen centuries. This is perhaps to claim rather too much for him. We may, however, note the following significant points.

(*a*) He had a fairly clear conception of the function of the heart as a pump. In this he was opposed by Galen who, following Herophilus, believed that the arteries

1 *Gal.* V, 563. 2 *Gal.* XV, 248. 3 *Gal.* II, 114.

4 *Gal.* IV, 706, and V, 185. Galen on the contrary says that the left ventricle contains blood.

5 *Gal.* XV, 360. 6 *Gal.* IV, 473. 7 *Gal.* VIII, 429; IV, 707. 8 *Gal.* V, 548, *sqq.*; 166; 206.

9 There is also an imperceptible "perspiration" (*διαπνοή, ἀποφορὰ κατὰ τὸ λόγῳ θεωρητόν*) mentioned by *Anon. Londin.*, XXXIII, which Erasistratus tried to investigate by experiment.

10 T. C. Allbutt, *Greek Medicine in Rome*, London, 1921, p. 305-6.

11 C. Singer, *Evolution of Anatomy*, London, 1925, p. 33.

are subject to dilatation and contraction owing to being closely connected, apparently by some nervous process, with the heart, so that their motions are simultaneous and identical with the motions of that organ. Erasistratus on the other hand asserts that the heart is filled because it becomes dilated, but the arteries are dilated because they are filled.[1] Erasistratus compares the heart to the blacksmith's bellows, the arteries to a skin bag.[2] The heart, then, according to Erasistratus actively dilates and contracts by its own innate force (δύναμις). The arteries, on the other hand, are passively dilated, owing to the stream of *pneuma* forced into them by the heart's contraction. They contract, presumably, by their own elasticity. The *pneuma* cannot regurgitate into the heart owing to the sigmoid valves.

(*b*) Arteries and veins are connected in the following manner:—

"Arteries and veins are continually divided into smaller and more numerous vessels and are carried all over the body; for there is no point at which there is not the termination of some vessel. The ends are such fine points that by the closing of their extreme orifices the blood is confined within them. Thus, though the orifices of vein and artery are very close to each other, the blood remains within its own bounds (i.e., the veins) and at no point encroaches on the breath-vessels (i.e., the arteries)."[3] These final orifices are the *synanastomoses*. Thus, he realized the existence of connexions between veins and arteries, through which blood might pass, though under normal circumstances he held that it did not so pass.

(*c*) The heart, however, he considered, was the origin of both sets of vessels.[4]

(*d*) It is sometimes stated that Erasistratus had some knowledge of the pulmonary circulation. The opinion is based on the following passage:—

"From the artery which lies along the spine there are branchings (apophyses) of vessels along each rib, right and left alike; these being still further subdivided (and dispersed) into the adjacent parts terminate in branches imperceptibly small. When, therefore, any blood falls into these arteries, it sometimes rises (λαμβάνει τὴν ἀναφοράν) by the hollow vein into the neighbourhood of the lung and also by the connexions by which the lung is attached to the artery along the spine; for thus blood which has entered (the artery) finds its way back to the lung by this way also."[5]

Galen here remarks that Erasistratus "seems deliberately to have made his statements obscure," and we must agree that it is difficult to interpret the above statement, which, moreover, is inconsistent with the general theory of Erasistratus. According to his doctrines we should expect blood to be expelled from the arteries by the same passage through which it entered. Moreover, the reference here is definitely to a morbid condition which results in spitting of blood, and not to any natural process of circulation. Finally, as already mentioned, Erasistratus conceives of blood flowing from the liver to the heart and thence to the lungs.

Yet when reason, observation and experiment had carried Erasistratus so far on the right road, a fatal and obstinate prejudice prevented him from reaching the goal. Faithfully following his teachers, he clung to the view put forward by Straton and Praxagoras that the arteries under normal conditions contained only air, or rather, not precisely air, but air in some mysterious way refined and transformed into spirit —a vital, life-giving spirit which was essential to the creature's existence. At the present day, with our accurate knowledge of the value of oxygen, we may regard this theory with interest,—though based entirely on guesswork,—while regretting that its followers were so impressed by its importance as to disregard the evidence of the senses; for Erasistratus well knew that blood flows from an artery when cut. To explain this he formulated the extraordinary theory that it actually comes from the

1 *Gal.* VIII, 703. 2 *Gal.* V, 562.

3 *Gal.* XI, 153. Galen notes (III, 492, *sqq.*) that these anastomoses are a positive danger, and so discreditable to "Nature."

4 *Gal.* V, 552. 5 *Gal.* VIII, 311.

veins through the *synanastomoses* to fill the vacuum caused by the sudden escape of the air or "spirit" from the severed artery.[1]

Erasistratus was therefore in as good a position as Harvey's immediate predecessor Cesalpinus, who believed that the arteries conveyed vital spirits to the tissues, and though he imagined the veins and arteries to be connected, did not think of a flow of blood between them, but held that both venous and arterial blood flowed from the heart to the extremities and ebbed back to the heart through their separate apertures. Erasistratus in fact, who definitely denied regurgitation, was even in advance of Cesalpinus.

Finally, we may note that if Erasistratus had ever got so far as a theory of complete circulation, he would probably have supposed it to move in the wrong direction. Even had he freed himself of the idea of air as the natural content of the arteries he had yet the handicap that he conceived of blood as coming from the heart to the veins first. To him it would have been a more than Copernican change to reverse the process and make the veins responsible for the backward journey.

(IV) Pathology.

Erasistratus considered the chief cause of disease to be *hyperæmia*, or, as he calls it, *plethora* (πληθώρη αἵματος) which causes blood to pass from the veins into the arteries.[2]

Whenever the bulk of the blood is increased beyond the normal and necessary limit, owing to excessive assimilation of food, the veins, becoming distended, are apt to overflow and discharge some of their surplus into the arteries.[3] The blood is there compressed by the *pneuma* which is constantly pumped from the heart. This compressed blood collects in the extremities of the arteries and causes local inflammation, of which fever is a concomitant. In the meantime the flow of the *pneuma* is impeded by the presence of the delayed blood, and its various functions cannot therefore be efficiently performed.[4]

Diseases thus caused differ according to the locality of disturbance. Erasistratus mentions in this connexion diseases of liver, spleen and stomach, coughing of blood, epilepsy, phrenitis, pleuritis, peripneumonia, synanche (angina), tonsillitis, pharyngitis, tracheitis, diseases of the loins and even of the eye. Only a few of these need to be dealt with specifically.

Thus, *Synanche* is explained as consequent on plethora, causing inflammation primarily in the organs of speech, tonsils and epiglottis. The inflammation might extend to the lungs and liver. *Pleuritis* is described as an inflammation of the membrane of the pleura (ὁ ὑπεζωκὼς τὰς πλευράς). Among the symptoms of this condition are difficulty in breathing and frequent expectoration, the latter being due to the purulent sediment produced by the inflammation accumulating in the *pleura mediastinalis* and thence passing by the veins to the lungs. If the *pus* reaches the heart, the result is fatal. All kinds of spontaneous hæmorrhage (e.g., αἵματος πτύσις and ἀναγωγή) are traceable to plethora, which results either in the bursting of veins, the decomposition of their coats, or the discharge of blood through the anastomoses. The cause of *dropsy* (ὕδερος), according to Erasistratus, is "a chronic and scirrhous inflammation of the liver or spleen, which prevents the assimilation (κατεργασία) of the food in the bowels and its distribution through the body, but changes it to water, which, being refrigerated, is deposited between the intestines and the peritonæum."[5] On dissecting a dropsical subject he found the liver as hard as a rock (*saxeum*).[6]

1 *Gal.* IV, 706, etc.

2 He regards any kind of hypertrophy as morbid and dangerous—even the condition of athletes in training, whose muscles and vessels become abnormally developed.

3 *Gal.* VII, 537-9.

4 "Plethora" may also be the result of a wound when, an artery being pierced, the air escapes and blood rushes into the vacuum through the anastomoses. If the wound closes, the blood in the artery collects, apparently, in the neighbourhood of the wound, and causes inflammation there.

5 *Gal.* XIV, 746.

6 Caelius Aurelianus, *De morbis chronicis*, III, 8, 111, 124.

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(V) The Doctrine of the Humours.

The humoral theory of Hippocrates and his School, or at any rate, the later developments of it, did not find favour with Erasistratus. He regarded investigation into the origin of the humours as superfluous to the physician and belonging rather to the province of natural science. On this account he almost entirely neglected the question of their properties. According to Galen he never mentioned black bile (melancholy) at all.[1]

Nevertheless he could not dispense altogether with a theory of the morbid condition of the bodily juices (*κακοχυμία*).

Thus, he considered apoplexy to be a disease of the brain giving rise to excessive secretion of mucus which prevents the psychic pneuma from passing into the nerves. A similar cause—the passing of tough and glutinous humours into some nerves from the veins—is assigned to paralysis, which may represent a lesion of the nerves of the whole body or of some parts only. In this connexion he mentions a case of intermittent paralysis[2] and another case of permanent paralysis consequent on excessive strain of the parts when replacing a dislocation.[3]

Similarly, he traced malnutrition (*ἀτροφία*) to the presence in the veins of the stomach of thick "humours," which cause indigestion by impeding the assimilation of food.[4] He could give no explanation for the morbid hunger which he described as boulimia, though he noted its occurrence on cold days and in cold districts. He explained the feeling of hunger in general as due to the muscular coats of the stomach performing their movements with nothing to work upon, and noted that the Scythians relieve it by tightening their belts.[5]

(VI) Hygiene, Therapeutics, Surgery, etc.

Erasistratus complained that many physicians of his time were not interested in Hygiene. He himself wrote a treatise on the subject (*ὑγιεινά*) and in general preferred prevention to cure.[6] This, however, did not prevent him from being, as Galen admits, extremely careful and precise in the treatment of his cases.[7]

His treatment for plethora, which he regarded as the cause of so many diseases, consisted primarily of starvation (*ἀσιτία*).[8] Whereas among his contemporaries and many later practitioners phlebotomy was a favourite practice, resorted to under the slightest excuse, he condemned its use and employed it only rarely, while his followers banned it altogether.[9] Erasistratus employed ligatures upon the arteries, especially under the armpits and in the groin,[10] for hæmorrhage, and was an advocate of the use of fomentations, poultices and the vapour-bath. Though he sometimes endeavoured to clear the system by means of emetics, he was consistently opposed to violent remedies, especially purgatives.[11] In general he gave the preference to carefully regulated exercise and diet and the vapour bath.[12] The use of these must be carefully organized to suit the individual patient, for, he wrote :—

"The systematic practitioner must carefully consider] familiarity] and unfamiliarity. People may work long at work they are accustomed to without feeling fatigue, but they grow tired after a short spell of unaccustomed work. Some people more easily digest indigestible food to which they are accustomed than more digestible food to which they are unaccustomed.

1 *Gal.* V, 123.
2 Cael. Aurel., *Morb. chron.*, II, 1, 15
3 *Gal.* XVIII, 13, 867.
4 Themison, *De acutis et chron. morbis*, in "Anecdota Graeca," *Rheinisches Museum* vol. xlix.
5 Aulus Gellius, *Noctes atticae*, xvi, 3.
6 *Gal.* XIV, 692. 7 *Gal.* V, 880; XI, 147.
8 *Gal.* XI, 228: "We should give no food at the time of the inflammation, for the veins when emptied will more easily receive back the blood which has invaded the arteries."
9 *Gal.* XI, 226. (He was afraid of lowering the patient's resistance.)
10 *Gal.* XI, 234. 11 *Gal.* XI, 239, *sqq.* 12 *Gal.* XI, 237.

So the body may, from custom, require certain purgatives, etc., which in themselves are unprofitable.'

As a last resort in serious cases he employed surgery. We hear of his performing an operation in the case of a malady of the liver, described as follows:—

. . . "cutting the skin and membrane which lie over the liver, he uses remedies applied round the liver itself. He also draws down the stomach, boldly exposing the affected part."[2]

He also recommended an inguinal operation for the removal of an empyema between the intestines and peritonæum.[3]

He disapproved, however, of tapping for dropsy, considering such operations dangerous and moreover useless;[4] for, it being impossible to remove the cause of the trouble, the fluid will continue to collect. In cases of stricture he employed a catheter of his own invention, shaped like an S.[5]

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Contributions to the History of Mummification.

By WARREN R. DAWSON.

§ 1. *Guanche Mummies in England.*

IT has long been known that the ancient inhabitants of the Canary Islands, the Guanches, embalmed their dead in a manner similar to that of the ancient Egyptians. From the accounts of their technique, to which considerable additions can be made from the mummy here described, it will be seen that the resemblance is more than superficial. There is evidence that the Guanche methods were of Egyptian origin.

In this paper I shall not discuss how the Egyptian influence reached the Canary Islands.[6] I shall merely give a detailed description of the specimen and call attention to the resemblances to the Egyptian technique.

Several writers have expressed the view that the Guanches learned how to mummify their dead from the Egyptians. Reutter,[7] for instance, suggested that the custom reached the Canary Islands by the mariners who circumnavigated Africa

1 *Gal.* Scr. Min. II, 16.

2 Cael. Aurel. *De morbis chronicis* III, 14, 65. Erasistratus in jecorosis praecidens superpositas jecori cutes atque membranas utitur medicaminibus quae ipsum jecur amplectantur; tum ventrem deducit audaciter partem patientem nudans.

3 Caelius Aurelianus, *De morb. chron.* V, 10, 127.

4 *Gal.* XVIIIA, 39.

5 *Gal.* XIV, 751.

6 This question has already been examined in detail by Professor Elliot Smith, *The Migrations of Early Culture*, Manchester, 1915, pp. 60-64.

7 *L'Embaumement avant et aprés Jésus Christ*, Paris, 1912, p. 138.