

Biswas, A. K. (1970). The Origin and The Rise of The River Nile. In A. K. Biswas, *History of Hydrology*, (pp. 78–91). Amsterdam: North-Holland Publishing.

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The origin and the rise of the river Nile

INTRODUCTION

‘Egypt is an acquired country, the gift of the River’ (*doran tu Potamu*), so said Herodotus, the father of history. Many ancient philosophers asserted that the Nile was superior to the other rivers of the world – that it was in a class by itself. Very few physical facts of antiquity received more discussion than the annual inundation of the river Nile. The Greek geographer and historian Strabo stated of the river that ‘its rising, and its mouths were considered, as they are at the present day, amongst the most remarkable, the most wonderful, and most worthy of recording of all peculiarities of Egypt’.¹ Greek philosophers were so intrigued by the regularity of the floods of the Nile that some believed that the river had been created along with the world, and that reason only could explain its peculiar characteristics. It was considered to be too vast and remarkable to have had the same origin as other rivers, and that is why one reason was sometimes advanced for its origin and another for the other rivers of the world.² The present chapter deals exclusively with the various theories put forward on the origin and rise of the special and almost ‘legendary’ river, the Nile.

ETESIAN WINDS OF THALES

Thales of Miletos, the chief of the seven wise men of ancient Greece, seems not to have handed down any works of his own. All our knowledge concerning him comes from the writings of other philosophers (see chapter 2). Thales conjectured those northerly etesian winds blowing against the direction of the flow of the Nile prevented the water from running into the sea.³⁻⁶ Etesian is the northerly wind which blows during summer with reasonable regularity. Herodotus discounted the theory because the Nile had risen even during years when the etesian wind had failed to blow. Moreover, if that were the cause, why are rivers in Syria and Libya, which also flow into the wind, not affected in a similar manner – particularly

when they are smaller rivers with weaker currents. It is interesting to note Herodotus's differentiation between strong and weak currents. He, perhaps, was the first man to do so.

The Spaniard Seneca strongly criticized Thales for his theory, and Euthymenes of Marseilles for his having supplied corroborative testimony. Apparently Euthymenes sailed down the Nile to what he claimed was the Atlantic Ocean, and observed that the rise in the Nile coincided with the etesian winds. (He probably lived towards the end of the sixth century B.C. – a time at which if he were questioned as to how the Nile was connected with the Atlantic Ocean, he himself would undoubtedly have failed to provide a satisfactory answer). Nevertheless, Seneca had a variety of reasons for opposing Thales' theory. One was that the rise of the Nile does not coincide with the blowing of the wind. That wind starts before the rise, and lasts until well after the river subsides. The rise also does not vary in unison with the blasts of the wind. 'Then, again, the Etesian winds beat on the shore of Egypt, and the Nile comes down in their teeth; whereas, if its rise is to be traced to them, the river ought to come from the same quarter as they do. Furthermore, if it flowed out of the sea, its waters would be clear and dark blue, not muddy, as they are.'^{3,4} From the last objection it may be deduced that Seneca did not completely understand Thales' theory. Seneca obviously did not think much of Euthymenes' testimony as 'in those days there was room for lying; when there was no knowledge of foreign parts, it was easy for foreign parts to ship us romances'.⁷

'OCEANUS' CONCEPT

The primitive Greek geographers imagined that the earth is encircled by an immense and swift stream called Oceanus. It existed so far beyond the sea that there was no mixing between the waters. It has no source or outlet. From it rose all the stars, excepting those of the constellation of the Great Bear, only to plunge back again. Herodotus stated that some were of the opinion that the Nile flows from Oceanus, and gave that reason for explaining its peculiar characteristics (figure 1).

How the concept of Oceanus came into being is extremely difficult to imagine. Homer had used it in both the *Odyssey* and the *Iliad*. In fact, he probably made the problem more complicated by interweaving mythology with geography therein. The legend of Oceanus is a charming story.⁸ Titan Oceanus was the son of Uranus (heaven) and Gaea (earth), and was

considered to be one of the basic elemental forces responsible for the creation of the world. He was an extremely powerful God, so much so that Homer considered his power second only to that of Zeus. He was wedded to his sister Tethys, and by her had three thousand rivers and three thousand Oceanids (sea-nymphs) – quite a remarkable achievement. He thus became the father of all the rivers, seas, and other types of primeval waters.



Figure 1. The world according to Hecataios of Miletos.

MELTING SNOWS OF ANAXAGORAS

Anaxagoras of Clazomenae went to Athens immediately after the Persian Wars. According to him the rise of the Nile is due to the melting of snow on the peaks of the Lybian mountains where the river begins. His explanation, though rational, is not entirely correct. Nevertheless, Aeschylus, Sophocles, and Euripides shared his view. Herodotus rejected Anaxagoras' view because it is 'positively farthest from truth'. His argument was that wind blowing from the direction of Libya is extremely hot. He believed that there must be rain within five days of

snowfall, and since rain and frost are unknown in that country, how could snow fall at all? Swallows and kites remain there throughout the year, and cranes migrate there to escape the Scythian winter.^{5, 6} All this tends to prove that the reason suggested is an impossible one. Though Herodotus was completely wrong in his supposition, one must give him credit for displaying coherence of thought in his search for truth.

Seneca said that the country is so hot that the Troglodytes (cave dwellers) built underground houses,^{3, 4} and silver became unsoldered. He admits there is some snow in the Ethiopian mountains, but if it were actually the cause, the Nile would rise in late spring or early summer as do the rivers originating in the Alps, Thrace, or Caucasus where it snows heavily. Melting occurs quickly with fresh and lightly packed snow. Old and hard packed snow melts more slowly. Thus early summer runoff should far exceed that which occurs later. The Nile floods however last for four full months, and its rate of rise is uniform – hence, the Anaxagorean theory has to be discounted.

ORIGIN OF EXPLANATIONS

Herodotus mentioned all three of the above theories, but following his usual practice, he fails to name their originators. Diels in his monumental work *Doxographi Graeci*⁹ has shown that all the three theories originated from the pseudo-Aristotelian treatise *On the rise of the Nile*. The writer attributed the first theory to Thales of Miletos, the second to Euthymenes of Marseilles, and the third to Anaxagoras. The question at once arises as to where the pseudo-Aristotelean author got those names. Probably, from Hecataios; as Herodotus was familiar with that geographer's views (in fact he often copied them). Hecataios is probably the earliest author who had even referred to that otherwise obscure person, Euthymenes.

EXPLANATION OF HERODOTUS

The Ionian, Herodotus, who considered all knowledge to be within his dominion,¹⁰ thought he knew the sources of all rivers except the Borysthenes (present Dnieper) and the Nile, but he received a little comfort for his ignorance by saying 'Nor, I think does any Greek'. He wanted to find the reasons for (a) the Nile's regular annual inundation, (b) its behaviour –

which is just the reverse of other rivers, and (c) its inability to create a breeze. One must admire the historian's curiosity in his earnest attempts to unravel the causes of these physical oddities. Apparently the Egyptians had no theories thereon, nor what is more important, did they even try to explain them. They were content with their faith in the Nile god, Hapi, and were willing to take anything and everything for granted. Hapi was depicted as a fat, bearded man with full breasts from which gushed the life-giving water (figure 2).



Figure 2. Hapi, the Nile god (by courtesy of Trustees of the British Museum, London).

He was dressed like a boatman and a fisherman, and wore a crown made from a sheaf of lotus plants. The Egyptians believed that the Nile had two entities: one, the Nile of Egypt, the other, the celestial Nile which flows across the heavens and can be seen as a luminous river (Milky Way). Herodotus rejected the etesian wind, melting snow, or the Oceanus theories as being true explanations for the rise of the Nile. He considered that they were presented by the Greeks for the sole purpose of advertising their own cleverness. He thereupon proposed an astounding hypothesis of his own, namely:

‘The sun, when he traverses the upper parts of Libya, does what he commonly does in summer – he draws the water to him and having thus drawn it, he pushes it to the upper regions [of the air probably] and then the winds take it and disperse it till they dissolve in moisture. And thus the winds which blow from those countries, Libs and Notus, are the most moist of all winds. Now when the winter relaxes and the sun returns to the north, he still draws water from all the rivers, but they are increased by showers and rain-torrents, so that they are in flood till the summer comes; and then, the rain failing and the sun still drawing them, they become small. But the Nile, not being fed by rains, yet being drawn by the sun, is, alone of all rivers, much scanty in the winter than in the summer. For in summer it is drawn like all other rivers, but in winter it alone has its supplies shut up.’¹¹

Herodotus believed that the upper Nile flows in the same direction as Danube – west to east (figure 3). He also confused the Niger with the Nile. But considering the fact that such erroneous ideas continued to exist in one form or another, for the next 2200 years, perhaps the historian deserves to be excused.

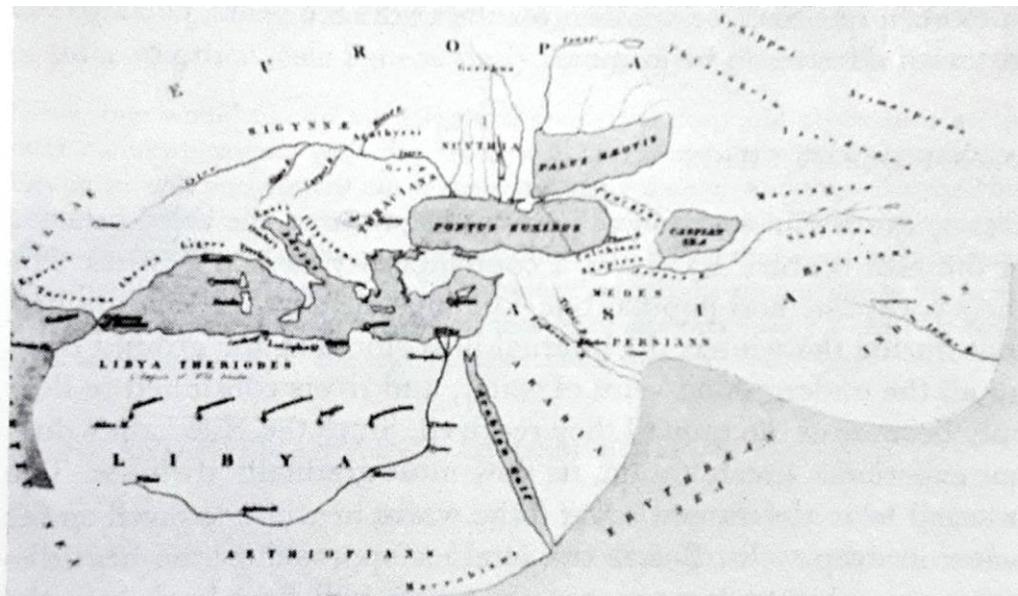


Figure 3. The world of Herodotus.

OENOPIDES OF CHIOS

Oenopides of Chios, who was in his prime around the third quarter of the fifth century B.C., was a contemporary of Hippocrates. His theory was the most popular one¹² in ancient times. He maintained that during the winter, the internal heat stored in the ground dries up all the underground veins of water, and rivers continued to flow only because of the rainfall they received. Since the Nile valley does not experience precipitation, its flow must gradually dwindle. The internal heat also caused caves to be warm in water as well as the water in deep wells. But as the summer approaches, the heat disappears, and as a consequence the water will flow back into the Nile and cause floods.

DIOGENES OF APPOLONIA

Diogenes of Appolonia was a Greek eclectic philosopher of the fifth century B.C. He was interested in physiology and cosmology, and was responsible for the reconciliation of the doctrines of Anaximenes of Miletos and Anaxagoras of Clazomenae. He believed that the water loss caused by the withdrawal of moisture by the sun is counterbalanced by the earth by drawing extra water – partly from the sea and partly from another source. During the summer the southern part of the earth becomes parched as the heat of the sun affects it most. The earth is interconnected by numerous secret channels, and through them water from the wet zone comes to the drier because wet and dry cannot exist together in nature. Thus ‘just as in a lamp, the oil flows to the point where it is consumed, so the water inclines toward the place to which the overpowering heat of the burning earth draws it’.¹³ The water thus attracted comes from the superabundant source of the northern region of eternal winter. Consequently, there is a flood of water travelling in one direction. If this process did not occur, the whole earth would have either dried up or flooded a long time ago. It was also the reason ascribed for the continuous swift current from the Black Sea to the Lower Sea in contradistinction to the alternate flow and ebb of tides in other seas. Seneca flatly opposed the theory. He said:

‘Now, one would like to ask Diogenes, seeing the deep and all streams are in inter-communication, why the rivers are not everywhere large in summer. Egypt, he will perhaps tell me, is more baked by the sun, and therefore the Nile rises higher from the extra supply it draws; but in the other countries,

too, the rivers received some addition. Another question – seeing that every land attracts moisture from other regions, and a greater supply in proportion to its heat, why is any part of the world without moisture? Another – why is the Nile fresh if its water comes from the sea? No river has a sweeter taste.^{13, 4}

SNOW AND ETESIAN WINDS OF DEMOCRITUS

Democritus of Abdera (460?–357? B.C.) was perhaps the greatest of all physical philosophers. He claimed to have ‘wandered over a larger part of the world than any other man of my time, inquiring about things most remote; I have observed very many climates and lands and have listened to very many learned men’.¹⁴ He declared that the snow melts and flows away in the northern parts during the summer solstice thus forming clouds by the vapours. The etesian wind drives the clouds towards the south and Egypt, and gives rise to violent storms which fill up the lakes and the Nile.

His theory is very interesting on two counts. It hints that the Nile has its source lakes in Central Africa and that they are rain-fed lakes. Even more important is his concept of the movement of storm systems, since until the eighteenth century it was commonly believed that storms did not move from one place to another.

EPHORUS TO STRABO

The Greek historian Ephorus (400–330 B.C.) believed that ‘all Egypt, being porous and made of river silt, and formed like pumice stone has long continuous crannies, and through these it takes up a great quantity of moisture, which it contains within itself in winter time, and in summer emits on all sides as it were streams of sweat; it is through these that the river fills’.¹⁵

There is considerable controversy over Aristotle’s opinion on the Nile. Sarton^{16, 17} considers it to be post-Eratosthenian, but Partsch¹⁸, believes that it had been written either by Aristotle himself or by one of his contemporaries. Whoever did write it claimed that the heavy rainfall during the spring and the early summer in the highlands of the Blue and the White Nile was responsible for the creation of floods in the lower river.

Eratosthenes (276–194/192 B.C.), the chief librarian at Alexandria, drew a reasonably accurate map of the Nile up as far as what is now Khartoum, and hinted that the equatorial lakes are the sources of the river. He said that there is no reason why man should speculate

on the rise of the Nile, because those sources of the Nile have been explored, and that heavy rainfalls have been observed there. Eratosthenes also mentioned that Aristotle had previously suggested this same theory.

Strabo of Amasya was a geographer who considered Homer to be the source of all knowledge and wisdom. He ridiculed Herodotus as being a ‘marvel-monger’. He traced the authorities for the rise of the Nile through a series of philosophers back to the ‘Master’ – Homer!

‘For he [Poseidonius] says, that Callisthenes asserts that the cause of the rise of the river [Nile] is the rain of summer. This he borrows from Aristotle, who borrowed it from Thrasyalces the Thasian [one of the ancient writers on physics], Thrasyalces from some other person, and he from Homer who calls the Nile “heaven-descended”: “Back to Egypt’s heaven-descended stream”.’¹⁹

Strabo quoted another philosopher, Nearchus, as saying that the rises of the Nile and the Indian rivers are caused by summer rains.²⁰ When Alexander the Great saw crocodiles and Egyptian beans during his conquest of north-western India, he thought that he had discovered a river that extended to the source of the Nile. He was about to equip a fleet to sail up that river to Egypt. Apparently he soon changed his mind, and Strabo soon traced his reason therefore back to the works of his master – Homer!

In the Middle Ages the Austrian Benedictine monk, Engelbertus Admontansis wrote a commentary about the pseudo-Aristotelean treatise on the flooding of the Nile.²¹

LUCRETIUS TO BEDE

The didactic epic *De rerum natura* (on the nature of things) was written by perhaps the greatest Roman poet, Lucretius Carus Titus (96?–45 B.C.). According to him, several causes must be cited for the many strange things in nature. It is like coming across a dead man who could have died by violence, poison, disease, or from cold. One of them must be the actual reason – but which one, one does not know. This, he suggested, is the case with the Nile. He stated the reasons put forward by Thales, Anaxagoras, and Democritus and added the following one (probably his own):

‘It may be too
That heaps of sand pile up against the river mouths

And check the current of the stream,
 When sea stirred up by heavy winds drives sand within,
 And so it comes about
 The exit of the water is less free
 The waves flow down less easily.²²

The King of Mauretania, Juba II (d. 20 A.D.), a historian and archaeologist, was the author of the work *Libyca*, from which Pliny has quoted. He revived an old theory about the course of the Nile but gave it a new form (figure 4). He stated that the source of the Nile is in western Mauretania – not far from the Ocean. From there it travels underground for a several days' journey to a similar lake in Mauretania Caesaiensis; thence underground again for another twenty days' journey (directions are not given) to the source Nigris – at the borderline between Africa and Ethiopia. From there it continues under the name Astapus, through Ethiopia. This absurd theory was accepted by many. It is probably the origin of the erroneous but long-lived idea that the Niger is a branch of the Nile. In one form or another, eminent scholars like Pliny, Mela, Vitruvius, and Strabo were later to become subscribers to this error.

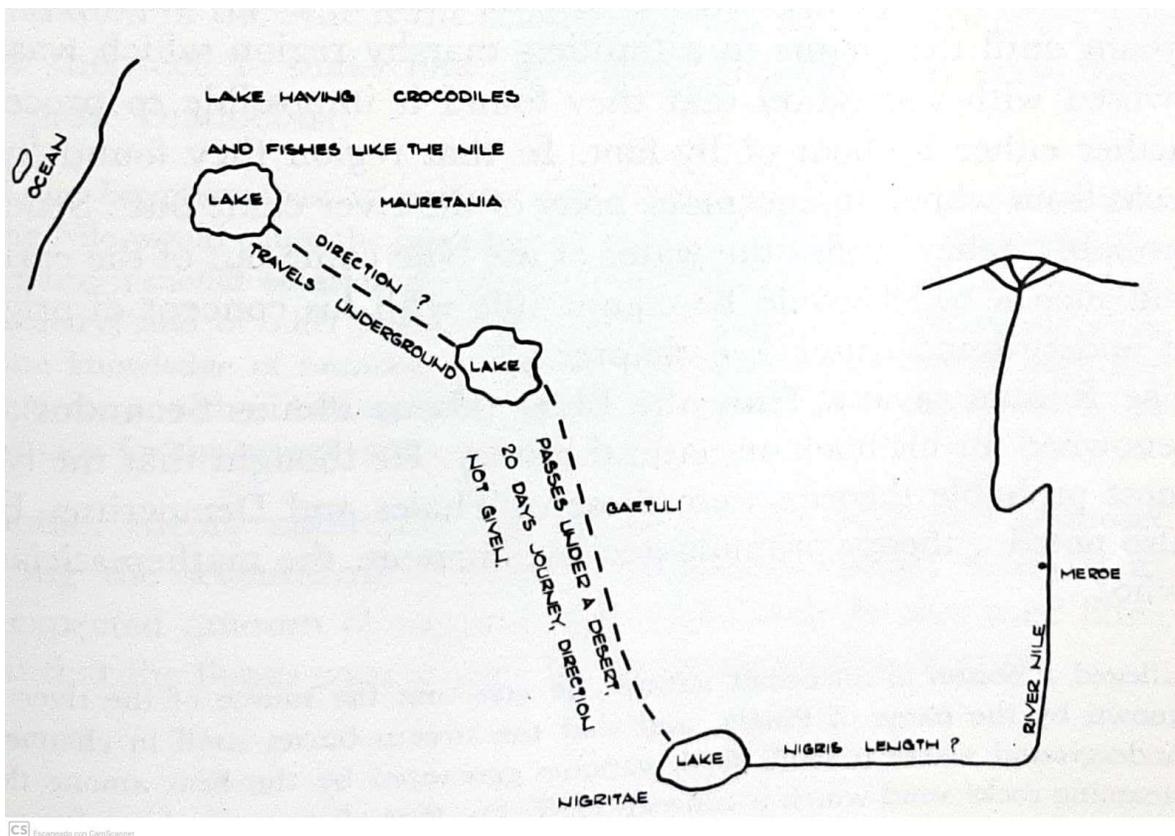


Figure 4. The course of the Nile according to Juba II, the King of Mauretania.

The treatise *Questiones naturales* by the Spaniard Lucius Annaeus Seneca mentions the views of other ancient philosophers on the rise of the Nile. His objections to them have already been described. The discussion thereon ends so abruptly that it is obvious that either it is incomplete or else there is a lacuna in the text. Seneca tends to agree with the ancient philosophers who stated that certain rivers were originally created as part of the world, and that this circumstance alone can explain their peculiar characteristics. He believed that the Nile and the Danube were too remarkable to have had origins of the same nature as those of other rivers. Unfortunately, he did not give any specific reason for the regularity of the inundation of the Nile. He does, however, mention that Nero dispatched two centurions up the Nile to find its source. They travelled upstream until they came to a limitless marshy region which was so covered with vegetation that they found it impossible to proceed further either by boat or by foot. In that region they found 'two rocks from which an enormous body of the river came out'. Seneca probably believed that the water of the Nile came out of the earth, and such a belief would be compatible with his concept of origin of underground water (see chapter 5).

The Roman savant, Pliny the Elder (Gaius Plinius Secundus), is renowned for his book on natural history. He thought that the two most probable theories were those of Thales and Democritus. He also noted a theory promulgated by Timaeus, the mathematician, who:

'alleged a reason of an occult nature: he says that the source of the river is known by the name of Phiala, and that the stream buries itself in channels underground where it sends forth vapours generated by the heat among the steaming rocks amid which it conceals itself; but that, during the days of inundation, in consequence of the sun coming closer to the earth, the waters are drawn forth by influence of his heat, and that on being thus exposed to the air, it overflowed; after that, in order that it may not be dried up completely, the stream hides itself again. He says that this takes place at the rising of the Dogstar, when the sun enters the sign of Leo, and stands in a vertical position over the source of the river, at which time no shadows occur at that spot.'²³

After Pliny, the English theologian and historian Venerable Bede (674–735 A.D.) compiled a summary of the causes of the inundation of the Nile.²⁴

During the fifteenth century, Leonardo da Vinci remarked that the source of the Nile can be traced to three very high lakes in Ethiopia.

‘It issues forth from the Mountains of the Moon from diverse and unknown beginnings; and comes upon the said lakes high above the watery sphere at an altitude of about four thousand braccia, that is a mile and a third, in order to allow for the Nile to fall a braccia in every mile.’²⁵

CONCLUSION

The various theories as well as the objections put forward against them by the ancient philosophers have been discussed in this chapter. Probably one of the greatest indirect benefits of the annual inundation of the Nile is the science of geometry. Its discovery arose from the need to make new land measurements after every flood. To quote Diadochus:

‘For the Egyptians had to perform such measurements because the overflow of the Nile would cause the boundary of each person’s land to disappear. Furthermore, it should occasion no surprise that the discovery both of this science (geometry) and of other sciences proceed from utility ... And so, just as accurate knowledge of numbers originated with the Phoenicians through their commerce and their business transactions, so geometry was discovered by the Egyptians for the reason we have indicated.’²⁶

Another theory about the annual rise of the Nile was proposed during the seventeenth century. The theory, which received an unexpected amount of support, and which will be discussed later, was that the floods were caused by the fermentation of nitre.

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