

Geological Society, London, Special Publications

Flood conceptions in Vallisneri's thought

Francesco Luzzini

Geological Society, London, Special Publications 2009; v. 310; p. 77-81
doi:10.1144/SP310.9

Email alerting service

[click here](#) to receive free email alerts when new articles cite this article

Permission request

[click here](#) to seek permission to re-use all or part of this article

Subscribe

[click here](#) to subscribe to Geological Society, London, Special Publications or the Lyell Collection

Notes

Downloaded by on 26 March 2009

Flood conceptions in Vallisneri's thought

FRANCESCO LUZZINI*

Via Vittorio Veneto 18, 20021 Bollate (Milan), Italy

*Present address: Edizione Nazionale delle Opere di Antonio Vallisneri, Via De Togni 7, 20123 Milan, Italy

Corresponding author (e-mail: francesco_luzzini@yahoo.com)

Abstract: The scientific studies of the Italian physician and naturalist Antonio Vallisneri (1661–1730) were concerned with the cultural and religious implications of the debate on fossils in the early decades of the eighteenth century. In *De' Corpi Marini* he summarized the main diluvial theories but declined to support them. He explained the presence of fossils in strata in mountainous regions as the result of localized multiple flood and emersion sequences, and restricted the direct action of God to the biblical Deluge. This theory clearly contradicted the biblical interpretation provided by Catholic orthodoxy, which affirmed the existence of a single global Deluge. Vallisneri therefore had to gloss over its real meaning and use a careful self-censorship system, a strategy that he frequently used in his books. The comparison with the work of several Italian and European authors had great relevance to Vallisneri's theories. He continually exchanged correspondence and natural objects with some of the most outstanding of the eighteenth century natural philosophers. This involvement with other scholars deeply influenced his thought, and helped him to reach a pre-eminent status in the Italian scientific community of the time.

In the early decades of the eighteenth century the debate unleashed by the organic interpretation of fossils drew the attention of European 'natural philosophers'. The introduction of a chronological dimension within the developing geological studies necessarily gave scientific subjects a philosophical and metaphysical meaning. The discovery of seashells and other organic remains within many strata in mountainous regions had been interpreted earlier as a clear result of the biblical Deluge, but the hypothesis quickly emerged of a chronological interpretation with a different timescale from that deduced from the Bible. Several European authors tried to explain how the Deluge took place, to reconcile fossil evidence with a biblical perspective. These efforts involved a loose interpretation of the Bible, especially on issues not directly related to doctrinal matters.

The scientific studies of Antonio Vallisneri were deeply concerned with the cultural and religious implications of the debate on fossils. The main lines of his thought on this subject were expressed in his chief natural history text, *De' Corpi marini, che su' Monti si trovano (Of marine Bodies that are found on the mountains)* (Vallisneri 1721a), which was republished in 1728.

To gain a wider comprehension of the events that led Vallisneri to formulate his theories, consideration must be given to his correspondence, especially letters he wrote to the Swiss naturalists Johann Jakob Scheuchzer and Louis Bourguet some time before and during the composition of

the book. Analysis of both *De' Corpi marini* and the letters allows an improved reconstruction of Vallisneri's thought, and facilitates understanding of some of the apparent inconsistencies that can be found in this work.

Vallisneri was, above all, an experimentalist. The establishment of the theories outlined in *De' Corpi marini* was the result of a direct interpretation of the many pieces of information he collected during his journeys in the Apennines, where he obtained a great quantity of experimental data and observations.

Careful analysis of fossil objects and rock layers made the biblical chronology implausible for Vallisneri. Moreover, unlike many European scholars (e.g. Woodward or Scheuchzer), he went so far as to believe the biblical Deluge unable to explain the presence and arrangement of fossils in rock strata. Vallisneri expressed this opinion as early as the first decade of the eighteenth century, in a letter to Luigi Ferdinando Marsili in 1705:

I send a box containing various objects to Mr Scheuchzer, make sure to watch for them. I will send some *antediluvian* figured stones too. I very much like this word that you have used, *antediluvian*. Therefore they are not *trophaea*, or *sedimenta diluviana*, as everyone writes. They are *antediluvian*, from which I can deduce the theory of the world of your Lordship. That is near to mine, in fact you believe that the sea once naturally covered the mountains. Don't you? (Vallisneri 1991, pp. 296–297).

Acquaintance with the work of several Italian and European authors was of great relevance to

Vallisneri's theories. He continually exchanged correspondence and natural objects (often fossils and minerals) with some of the most outstanding of the eighteenth century natural philosophers. This involvement with other scholars deeply influenced his thought. Also, he had read Thomas Burnet's *Telluris theoria sacra* (Burnet 1681) and the Latin translation of John Woodward's *Essay* (Woodward 1704), made by Scheuchzer in 1704. However, he did not share their efforts to fit the existence of fossils to the biblical text. Instead, he came to believe that the biblical Deluge was irrelevant to the data collected during his journeys. He expressed his theory in a detailed letter to Bourguet in 1710:

I suspect that there are no (at least in Italy) sure . . . evidences of the Deluge, but that the sea was once there, and later went away, and left uncovered the hills and mountains, that once were as cliffs . . . as every day we observe behind the shores of our seas. My main argument is that I have seen in the course of my mountain travels . . . the marine bodies to be only up to a certain height, and only on those slopes facing the sea, and this for the mountains facing the Adriatic, and for the Tuscan sea . . . and so on: because should they have been left from the Deluge, I see no reason why the marine bodies should not be found on the Alps too, or inside the cavities of the mountains . . .

Secondly, I infer from experience that Italian seas in many places, and especially in the front of the sites where marine bodies are found, gradually retreat from the land, on the contrary flooding other countries, opposite to ours.

Third. I infer that . . . the bodies, the kind of soil in those hills and mountains are the same found in the present shores of our seas (Vallisneri 1991, p. 583).

The presence of fossils in mountain strata was therefore explained as the result of multiple flood and emersion sequences of various parts of the Earth's crust.

A major role in the formulation of this theory was probably played by the age of the rocks Vallisneri had to deal with. The fossils he studied came from late Cenozoic or Quaternary strata, and therefore resembled present-day organisms more than did the English fossils, found in Mesozoic or Palaeozoic strata. Thus British researchers (such as Woodward, Hooke or Lister) had different problems to solve in developing their theories compared with Italian naturalists.¹ It does not seem accidental that Vallisneri's opinion resembled the ideas expressed by Bernardino Ramazzini in *De fontium Mutinensium admiranda scaturigine* (Ramazzini 1691) and Agostino Scilla in *Vana speculazione disingannata dal senso* (Scilla 1670). Both these authors (whose books Vallisneri read and quoted; Vallisneri 1715, pp. 20, 55, 56; 1721a, pp. 58–60) examined the Pliocene and Pleistocene sediments of Italy and found it difficult to adapt the experimental data they collected to the model of a single, global Deluge.² Scilla

supposed that a sequence of consecutive floods had happened. Ramazzini diminished the importance of the biblical Deluge with respect to geomorphological processes, arguing that the sediments of the Po valley had been left *in situ* mainly by the protracted action of rivers and streams over many years.

As Ramazzini repeatedly pointed out in his book, his deductions were based on the observation of the Po basin sediments only, and, at least until further verifications, his interpretation had to be considered as limited to this area (or at most to northern Italy). This advice was very close to Vallisneri's thought, when in 1710 he wrote to Bourguet about his theories:

My system may perhaps be verified in Italy alone, but I speak of what I have seen, not of what I have not seen. (Vallisneri 1991, p. 583).

A careful empiricism in developing his scientific theories characterized Vallisneri's work. Generali has noted how the author made a respect for empirical evidence coexist with the attempt to integrate his scientific thought into a more comprehensive philosophical system (Andrietti & Generali 2002, pp. 70–72). His early years of activity were characterized by adherence to the Cartesian principles that he learned while attending Francesco Malpighi's lessons in Bologna University. In 1698 he read Nicolas Malebranche's *Recherche de la vérité* (Malebranche 1674–1675), and agreed with his refutation of animal insensitivity according to Cartesian theories. From 1713 he was deeply influenced by Leibniz's philosophy, whose theories he learned while corresponding with Louis Bourguet. He especially worked on the doctrines of *scala naturae* and of the recognition of divine providence in nature. He addressed these topics in the *Lezione Accademica intorno all'Origine delle Fontane* (*Academic Lesson on the Origin of Springs*; Vallisneri 1715), and in the 'Lezione Accademica intorno all'ordine della progressione, e della connessione, che hanno insieme tutte le cose create' ('Academic Lesson on the connection and order of progression which all created beings have'), included in Vallisneri (1721b).

In the *De' Corpi marini* experimental observation and philosophical interpretation coexisted and interacted to strengthen Vallisneri's theories. As in his other works, the starting point was an account of empirical data, reported by the author himself or by a friend. In this case the argument started from a letter written by Sebastiano Rotari in 1716 concerning the many petrified fish and other marine bodies found on Mount Bolca in northern Italy.

Vallisneri's answer began with a consideration of the real origin of these objects. His first attack was directed against the theories that explained the presence of fossils in rock layers as the result of a

vis lapidifica, or *spiritus plasticus* (i.e. petrifying and shaping powers) within them, or that believed them to be a product of the development of seeds and eggs carried through the strata with vapour and seawater. Although Vallisneri recognized the biogenic origin of fossils, he firmly denied their growth *in situ*. He disproved the hypothetical passage of seeds and eggs through the rocks in water from the sea. This stance was connected to the ideas expressed in the *Lezione Accademica* (Vallisneri 1715), where he proved the non-existence of Cartesian *alembics* (i.e. filters) in rock layers and, therefore, the non-existence of filtering devices to convert salt water into freshwater.³

His second attack was against the *lusus naturae* ('freak of nature') interpretation. According to Vallisneri, experimental observation was enough to challenge these assumptions: the marine petrified bodies were too similar to living sea creatures to be considered as 'jokes of nature'.

Once these 'rancid, and abominable opinions' were removed (Vallisneri 1721a, p. 16), he attempted to confront the thorny issue of the Deluge:

Many people appeal (and it seems to be the most common opinion) to the universal Deluge, but I greatly fear that they have a wrong conception of it, as they suppose the sea to have flooded all the Earth, when rather the common freshwater did it (Vallisneri 1721a, p. 19).

Thus he considered that seawater was not responsible for the Deluge. Also, the fossils were not found uniformly in the rocks, but only in some localities. This conflicted with the biblical statement of a Deluge that spread over the entire world. However, Vallisneri also did not consider freshwater to be the cause of fossils in rock strata. The fish and shell fossils in sedimentary layers clearly belonged to marine organisms; moreover, it was almost impossible to understand how rainwater could naturally cover the entire planet in just 8 days. Therefore, all the available water on the Earth was for Vallisneri simply not enough to cover the dry land up to the highest mountains. The Flood consequently had to be considered as a purely supernatural event:

My Lord, we cannot understand completely what we can daily see and touch with our hands, but we wish to know such a portentous prodigy ... and we try to explain it, despite nature, with the same laws of nature, as some experienced but narrowminded people claim to do? The Deluge occurred, God punished ... the treacherous ingratitude of human beings, but I cannot understand how this took place, if I do not resort to ... his unpredictable will, and to his endless omnipotence. (Vallisneri 1721a, p. 24)

With this declaration the author clearly diverged from diluvialism. From this point of view, Burnet's opinion of a Deluge entirely comprehensible by means of natural causes was unacceptable. Also, the Woodwardian fossil-based system was far from Vallisneri's

thought, because only the fossils were considered by Woodward as the real proof of the Flood.

The act of faith in a totally supernatural event asserted in *De' Corpi marini* may appear to contradict the earlier claim that Vallisneri was sceptical of a global Deluge. However, as Generali pointed out (Andrietti & Generali 2002, pp. 70–80), this doubt fades if we refer to some of the letters written by Vallisneri before and during the publication of his work. In these, he confessed his real opinion, as we can see in a paper sent to Louis Bourguet in 1718:

My beloved Mr Louis, the Earth is far older than is believed. We can see how many changes occur on the Earth in just a few centuries: rivers shift, older mountains go down and new ones arise, there are seas and valleys now where dry land once was, or land and fields where once were water and seas. The great plain that surrounds the Po river was once a swamp ... now there are cities and castles ... Earthquakes, volcanoes, the rains sometimes immense, the sea storms, the wind force and other can cause the strangest changes. And what if ... the sea that surrounds Italy would once have been high up to the mountains ...? Unless the faith we owe to the Holy Text ... who assures us of the Deluge? The Chinese question it, and so do a lot of evidences that now ... I have no time to show (Vallisneri 2006, p. 353).

The partial mismatch between published (and public) theories and private communication can offer some insight into the censorship problem that scientific authors had to face in Italy, as well as the kinds of strategies that they used to circumvent it. The position assumed by the Catholic Church on the age of the world and the universality of the Deluge is a controversial issue. As Dal Prete explained, it varied depending on the censor's beliefs and on the tone used by authors when they stated their ideas, as well as on the cultural and social context in which these ideas were expressed. However it has been assumed that censorship became more severe with the Counter-Reformation (Dal Prete 2007). Vallisneri's theory clearly contradicted the biblical interpretation provided by Catholic orthodoxy, which affirmed the existence of a single global Deluge. Vallisneri therefore had to gloss over its real meaning and use a careful self-censorship system.

Vallisneri repeatedly declared the truth of the Deluge in the *De' Corpi marini*. He made these claims to permit its publication, as he confessed in a letter to Bourguet in 1722:

When we resort to miracles, natural history provides everything. I indeed often use them in my treatise. But do you know why? To make the priests be silent, otherwise I imply that the events I speak of did not happen, as Woodward, and many scholars with him imagine (Vallisneri 2006, p. 738).

Vallisneri used considerable skill to show his real thoughts about the fossil issue. The declaration of orthodoxy occurred often in the book, but almost always a series of experimental data clearly

opposite to the diluvial theory was listed afterwards. These data had to be neutralized by a careful and prompt claim to the truth of the Deluge, but Vallisneri's real assumptions were disclosed, as many undeceived readers, often the author's friends, knew well. Moreover, he strongly insisted in his book upon the exceptional and divine origin of the Flood in a call to faith that could paradoxically be read as a call to remove religious interpretation from the study of natural history, and that could be also interpreted as the price that Vallisneri had to pay to explain his theories without the risk of running into clerical censorship.

Vallisneri was not an atheist. Many assertions in his letters suggest that his faith in God was sincere. He none the less believed that religion and science answer different questions: respectively, why and how world was made, a view of Galileo that he probably learned from Malpighi⁴ and developed himself, and that he expressed clearly to Bourguet in another of the many letters sent to his Swiss friend:

I do not understand how the Deluge left the shells on one slope and not on the other . . . Your Lordship, like other learned and wise men, consider it as true, above all because the Holy Scriptures state it; but the Holy Scriptures cannot teach anything to the natural philosophers, and fill up the mind with prejudices, while they teach the ways of Heaven, and not the phenomena of the Earth. We need to venerate in silence the Holy Mysteries contained in it, but we cannot claim to understand them (Vallisneri 2006, p. 563).

On the other hand, this stance must not make one think that Vallisneri's thought was free from doubt or problems. In some pages of *De' Corpi marini* he questioned whether the Flood occurred not over the entire planet, but only in the Middle East, which he assumed to be the only populated part of the Earth during the Old Testament time:

The third (hypothesis is) that the Flood was extended just to Asia, the only populated land in those days, and not to the entire world; so that the term *universal* should be intended just like many words from the Holy Scriptures are, that is, metaphorically, referring to all the world once known, and inhabited. Should this assertion be true, all the reproaches and the difficulties would be brought to an end, since it could explain in a far better way all the mentioned phenomena concerning the animals and plants that were easily transported from one place to another. But I cannot assent to it . . . and this due to the Holy Scriptures . . . and to the Holy Fathers who agree with it, and to the water equilibrium, that necessarily must be sought (Vallisneri 1721a, p. 89).

This cautious supposition (prudently retracted in the next sentence) may perhaps be read as a mild effort to link scientific explanation with religious interpretation. However, the author seems to be less at ease here than in other passages of the book.

Such an assumption was extremely vulnerable to both the sides of religious orthodoxy and scientific verification. Vallisneri was probably well aware of

the risk, and preferred to persist in keeping science and religion apart. In fact, the prevailing tendency in *De' Corpi marini* was to claim reciprocal independence between faith and science, a position that Vallisneri sustained throughout the course of his scientific activity.

Notes

¹As Rudwick and Morello pointed out, Martin Lister denied the organic origin of several English fossils as their shape was too different from that of living organisms. This difficulty was not faced by natural philosophers who studied Italian rocks, where the fossils closely resembled many known life forms (see Rudwick 1972, pp. 62–63; Morello 1979, pp. 19–20).

²Noah's Deluge is not the only flood mentioned in the Bible. In Genesis 1: 1–9 God made the waters cover the Earth. That event was not considered, however, as it happened before God created the sea creatures (Genesis, 1: 19–22), and therefore could not have caused the presence of fossils in rock strata.

³As Rappaport noted (1997, pp. 166–171), Vallisneri's work on the origin of springs aroused interest in part because it challenged diluvialism: he offered evidence that subterranean waters could not rise to all altitudes, whereas the contrary position had been an essential part of Woodward's treatise.

⁴The role played by Galileo in Vallisneri's work is beyond the scope of this paper. However, his influence is evident here, both in the experimentalism and in the call to keep science and faith apart. Moreover, Vallisneri graduated at Bologna University, where his teacher Malpighi always claimed a Galilean parentage. This academic background probably had a great influence on Vallisneri's thought (see Rappaport 1997, pp. 32–33).

References

- ANDRIETTI, F. & GENERALI, D. 2002. *Storia e Storiografia della Scienza*. Franco Angeli, Milan.
- BURNET, T. 1681. *Telluris theoria sacra: orbis nostri originem et mutationes generales, quas iam subiit aut olim subiturus est, complectens. Libri duo priores de Diluvio & Paradiso*. Kettilby, London.
- DAL PRETE, I. 2007. *Scienza e Società nel Settecento veneto. Il caso veronese 1680–1796*. Franco Angeli, Milan.
- MALEBRANCHE, N. 1674–1675. *De la recherche de la verite. Ou l'on traite de la nature de l'esprit de l'homme, & de l'usage qu'il en doit faire pour eviter l'erreur dans les sciences*. André Pralard, Paris.
- MORELLO, N. 1979. *La macchina della terra, teorie geologiche dal Seicento all'Ottocento*. Loescher, Torino.
- RAMAZZINI, B. 1691. *De fontium Mutinensium admiranda scaturigine tractatus physico-hydrostaticus Bernardini Ramazzini in Mutinensi Lyceo medicinae professoris. . . Typis Haeredum Suliani Impressorum Ducalium, Modena*.

- RAPPAPORT, R. 1997. *When Geologists Were Historians, 1665–1760*. Cornell University Press, Ithaca, NY.
- RUDWICK, M. J. S. 1972. *The Meaning of Fossils: Episodes in the History of Paleontology*. University of Chicago Press, Chicago, IL.
- SCILLA, A. 1670. *La vana speculazione disingannata dal senso. Lettera responsiva circa i corpi marini che petrificati si trovano in varij luoghi terrestri*. Appresso Andrea Colicchia, Naples.
- VALLISNERI, A. 1715. *Lezione Accademica intorno all'Origine delle Fontane, colle Annotazioni per chiarezza maggiore della medesima, di Antonio Vallisneri, Pubblico Primario Professore di Medicina Teorica, e Presidente nell'Università di Padova. A Sua Eccellenza il Sig. Generale Co. Luigi-Ferdinando Marsilli*. Appresso Gio. Gabbriello Ertz, Venice.
- VALLISNERI, A. 1721a. *De' Corpi marini, che su' Monti si trovano; della loro Origine; e dello stato del Mondo avanti 'l Diluvio, nel Diluvio, e dopo il Diluvio: Lettere critiche di Antonio Vallisneri, Pubblico Primario Professore di Medicina Teorica nell'Università di Padova. Con le Annotazioni, alle quali s'aggiungono tre altre Lettere Critiche contra le Opere del Sig. Andry, Francese, e suoi Giornali. A Sua Eccellenza la Signora Contessa D. Clelia Grillo-Borromea*. Domenico Lovisa, Venice.
- VALLISNERI, A. 1721b. *Lezione Accademica intorno all'ordine della progressione, e della connessione, che hanno insieme tutte le cose create, etc. A' miei stimatissimi Compatriotti, e Dottissimi Colleghi dell'Accademia de' Muti di Reggio, e segnatamente all'Illustriss. Sig. Conte Borso Vallisneri*. In: VALLISNERI, A. (ed.) *Istoria della Generazione dell'Uomo, e degli Animali, se sia da' Vermicelli spermatici, o dalle Uova*. Appresso Gio. Gabbriel Hertz, Venice. 421–437.
- VALLISNERI, A. 1991. *Epistolario. Vol. I (1679–1710)* (Ed. GENERALI, D.). Franco Angeli, Milan.
- VALLISNERI, A. 2006. *Epistolario (1714–1729)* (Ed. GENERALI, D.). Olschki, Florence. [CD-ROM].
- WOODWARD, J. 1704. *Specimen geographiae physicae quo agitur de Terra, et corporibus terrestribus speciatim mineralibus: nec non mari, fluminibus, et fontibus. Accedit Diluvii universalis effectuumque eius in Terra descriptio . . . Gessner, Zürich*. [Transl. by Scheuchzer, J. J. of Woodward, J. 1695. *An Essay toward a Natural History of the Earth. . .* R. Wilkin, London.]