Pim de Klerk & Hans Joosten

How ancient cultures perceived mires and wetlands (3000 BCE – 500 CE): an introduction

IMCG Bulletin 2019-04 (May-July)
pages 4-15

Egyptian wetland scene, c. 1900 BCE, Memphite region; Metropolitan Museum of Arts, New York

Ground truthing peatland occurrence along the Ethiopian-S.-Sudanse border near Gambela. Photo: Hans Joosten.

IMCG Bulletin 2019-04: May – July 2019

INTERNATIONAL MIRE CONSERVATION GROUP

www.imcg.net

Contents of this Bulletin

How ancient cultures perceived mires and wetlands (3000 BCE – 500 CE): an introduction

Pim de Klerk (Greifswald Mire Centre/State Museum of Natural History Karlsruhe, pimdeklerk@email.de) &
Hans Joosten (Greifswald Mire Centre; joosten@uni-greifswald.de)

The reconstruction of the past development of peat- and wetlands is normally the task of a wide variety of biological and earth-scientific disciplines (Birks & Birks 1980; Berglund 1986). An important source is, however, often overlooked: contemporary written accounts of eye-witnesses of these landscape types. Written records are generally considered to belong to the realms of linguistics, literature, history and theology, which often prevents them to be interpreted using the most recent insights of biology, (palaeo)ecology and earth sciences. As a result, the full information hidden in the texts is often not disclosed.

Thorough evaluation of writings from Antiquity by Lordkipanidze (1996, 2000) helped us to interpret the cultural context of pollen and macrofossil data from a mire in west Georgia (Transcaucasia) (De Klerk et al. 2009). This inspired us to have a more systematic and comprehensive look at ancient texts with special attention to mires and wetlands. We currently focus on Mesopotamia (Sumer, Babylon, Akkad, Assyria and Elam) and the neighbouring realms of the Hittites, Hurrians and Persians, ancient Canaan (developing into Hebrew and Phoenician states), ancient Egypt, and the ancient Greek and Roman civilisations (Fig. 1). The time-slice covered runs from c. 3000 BCE to 500 CE.

In this paper we introduce the project and present various thematic aspects of the ancient literature.

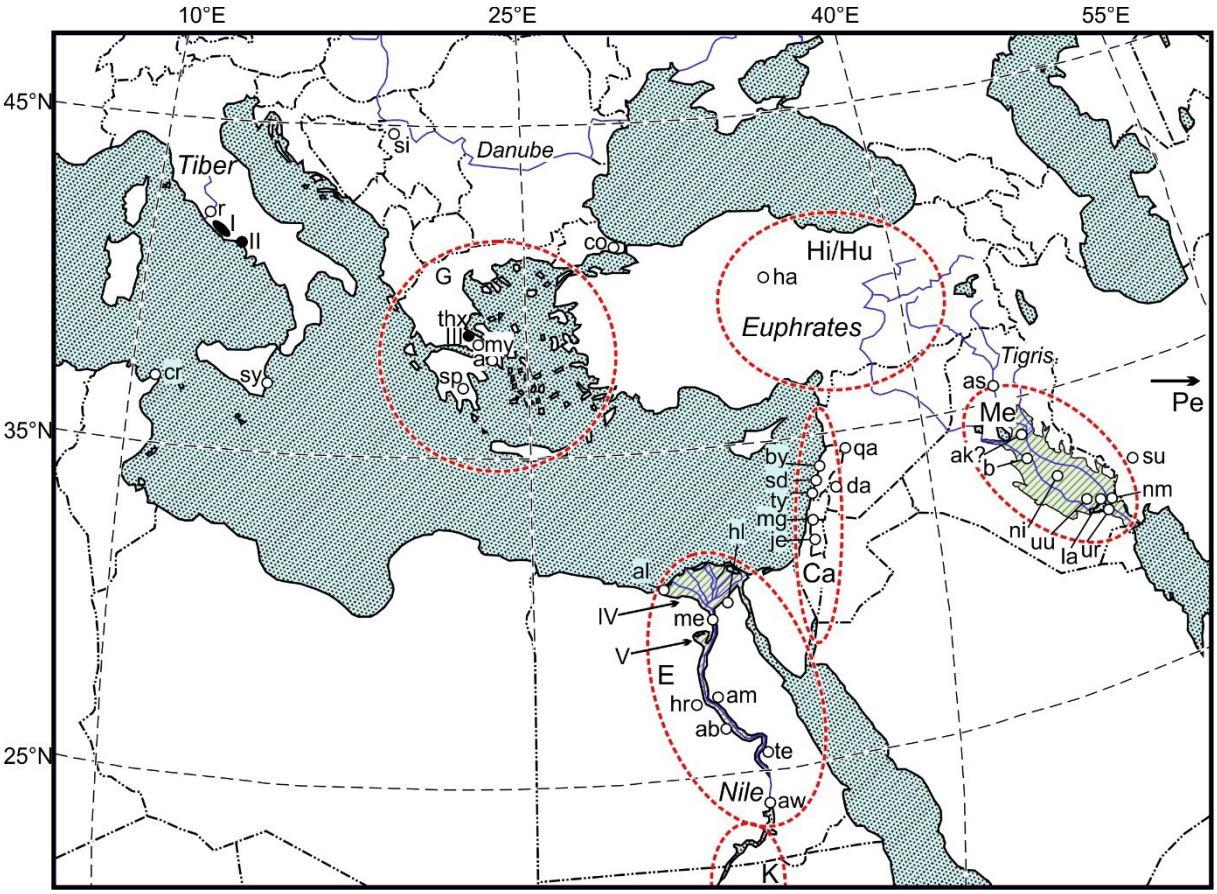

Figure 1: Map of the eastern Mediterranean and the Near East. Red circles*: core areas of ancient civilisations (extent changed regularly):* Ca*: Canaan (developing into various Hebrew and Phoenician states);* E*: Egypt;* G*: Minoan and Mycenaean realms (developing into the ancient Greek city states);* Hi/Hu*: Hittite and Hurrian realms (also including the state Mitani);* K*: Kush/Nubia;* Me*: Mesopotamia (Sumer, Babylonia, Akkad, Assyria, Elam; note that the coastline of the Persian Gulf by delta protrusion moved considerable to the southeast since Sumerian times, when Uruk was a coastal city);* Pe*: Persia.* O*: The most important cities from Antiquity, and other cities mentioned in the text:* a*: Athens;* ak*: Akkad;* as*: Assur;* aw*: Aswan;* b*: Babylon;* by*: Byblos;* co*: Constantinople;* cr*: Carthage;* da*: Damascus;* hl*: Heliopolis;* hr*: Hermopolis;* je*: Jerusalem;* me*: Memphis;* r*: Rome;* si*: Sirmium;* sy*: Syracuse;* te*: Thebes;* ur*: Uruk.* x th*: Battlefield at Thermopylae.* • *Mires/wetlands mentioned in the text:* I*: Pontine marshes;* II*: Marshes near Minturnae;* III*: Former lake Copais and its mires;* green-striped areas*: floodplains (with marshes) of Mesopotamia and the Nile River:* IV*: Nile Delta;* V*: Faiyum.*

Terminology

Efficient communication requires that readers/listeners are able to understand what authors/speakers mean to say. This requires that all speak/write about the same objects using the same unambiguous and consistent vocabulary without making errors (Joosten & De Klerk 2002). At present, mire and peatland vocabulary greatly differs between languages, and different communities use identical or similar words with different connotations (Joosten et al. 2017).

Communication is even more complicated with texts of dead languages, stemming from times in which scientific knowledge on wetlands was merely rudimentary and authors used identical or similar terms and phrases with different intentions, or used different terms for identical elements. Even the primary audiences must have understood the original intentions differently.

The latter is illustrated by names of plants in texts from times when a standardized taxonomy did not exist (although the 4th century BCE Greek philosophers Aristotle and Theophrastus already went in that direction). A nice example from the 1st century CE is the phrase "Cyperos iuncus est" ("Cyperus is a rush") by Pliny the Elder ('Natural history' XXI:70). The plant named 'ιππουρις (hippuris) in Greek (Dioscorides, 'On medical matters' IV:46; 1st century CE) was according to Pliny the Elder identical with the plant named equisaetum in Latin ('Natural history' XXVI:83): both names derive from, respectively, the Greek and Latin words for horse, but the present-day *Hippuris* and *Equisetum* are completely different plant taxa. The descriptions of both authors allow an unambiguous identification of the taxon presently known as *Equisetum*, but in many cases ancient morphological/ecological descriptions, when present at all, are insufficient to unmistakably identify a plant taxon.

In different languages a great variety of names exists for reeds, but in many cases these terms do not indicate the species *Phragmites australis*, but reedbeds in general or other typical reedbed plants. Words for reed were also used synonymously for products made from reeds: e.g. (pan)flutes and reed-played musical instruments, arrows, writing pens, gluesticks for fowling, reedcrowns, weaving rods, and many more.

If one is unfamiliar with the language in question one has to rely on the interpretation of translators. Most translators of ancient texts originate from the disciplines of linguistics, literature, history, or theology, and are understandably not fully acquainted with terms, names and concepts from modern natural sciences.

Thus, translating ancient vocabulary into present-day terms is a great challenge that requires intensive multidisciplinary exchange to arrive at the best possible interpretation. The linguistic and etymological work of Joosten et al. (2017) provides a robust framework of peatland terms for such a task. Unclarities will, however, remain, especially with respect to the question whether the wetlands described were peat-forming or not, which would determine which modern term to use. In this paper we still use somewhat casual terms.

Topography and mire descriptions

Topography, a topic very well covered in works from Antiquity, includes the location of mires. Marshes occur already on rudimentary cartographic works from Mesopotamia dating back to the early/mid 2nd millennium BCE (cf. Wheat 2012). But the topic topography also covers the names of places or regions. According to Hilprecht (1896), the ancient Sumerian name Kengi for the Sumerian/Babylonian regions derives from the words ki for kingdom, e for canal, and gi for reeds, so the region was named something like 'The land of canals and reeds'. Well-known is the quote of Tacitus that Germania consisted of "desolate forests and pestilent marshes" ('Germania':5). Strabo stated in the 1st centuries BCE and CE that cities named Helos, Heleon and Helesion in Arcadia, Laconia and Boeotia (Greece) were named after the Greek word 'έλος (helos) meaning mire, which partly had already disappeared in his time ('Geography' VIII:3.25; VIII:5.2; IX:2.12). His assumption that peatlands must have existed there previously is a nice example of ancient palaeoecological thinking. As alternative explanation he posed that the original places had been abandoned and were rebuilt elsewhere while retaining their original names.

Detailed descriptions of mires and other wetlands from Antiquity are rare, first of all since these landscape types were not easily accessible, but also because in most writings wetlands were only a part of the scenery and not the main subject. Numerous travellers mentioned reedlands that they had seen along rivers and lake shores as prominent landscape elements, but precise descriptions are rare. A detailed description of the reedbeds of lake Copais (Fig. 1) is included in the botanical work 'Enquiry into plants' (IV:10-12) of Theophrastus from the 4th century BCE. The lake was drained in 1887 CE, after which during a warm and dry summer four meter thick peat

layers burned away (Christanis 2017). After the destruction of this palaeoecological archive, the texts of Theophrastus (and later Pliny the Elder) are the only remaining source on its vegetation in the past.
Information on the appearance of wetlands can be obtained from numerous other writings as well. Such descriptions enabled Ferrari et al. (2013) to provide a thorough ecological description of the marshes near Minturnae (Fig. 1) in Roman times.
Descriptions of wetlands do not only deal with their general appearance, but also with their flora and fauna. Especially the works on natural science of Theophrastus ('Enquiry into plants', 'On the causes of plants'), Aristotle ('History of animals', 'Parts of animals', 'On the generation of animals'), Dioscorides ('On medical matters'), and Pliny the Elder ('Natural history') are important in this respect. Sculptures and pictures of animals and plants provide additional information on the ancient views on flora and fauna (e.g. Arnold 1995; Kantor 1999; Pommerening et al. 2010).

War

Wars were elaborately depicted by many ancient historians. Mires and wetlands had three main functions: they were hide-outs, natural defences, or traps.
Depictions how people sheltered in marshes occur amply in the works of Caesar ('About the Gallic war'), Josephus ('War of the Jews'), Tacitus ('Agricola', 'Annals', 'Histories'), Plutarch ('Parallel lives'), and many more. The text on the 'First campaign of Sennacherib' (c. 700 BCE) tells how Assyrian troops searched for Chaldean enemies who sheltered in marshes, an endeavour also displayed on a relief (Fig. 2). Pliny the Elder wrote that Octavian, the emperor-to-be Augustus, hid three days in a marsh when he suffered from an oedema ('Natural history' VII:46).

Figure 2: Fragment of a relief displaying Chaldean people sheltering in the reedbeds during a campaign around 700 BCE; relief from 640-620 BCE. British Museum, London. ©Trustees of the British Museum. Shared under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0) licence.

Various locations were protected by the natural barriers that mires provide. Caesar described how during his Gallic campaign in the 6th decade BCE the Menapii were protected by extensive marshes and woods ('About the Gallic war' VI:5). He also wrote how Vercingetorix had camped along a marsh at some distance to Avaricum ('About the Gallic war' VII:16). Thucydides wrote about marshes that partly encircled the city of Syracuse on Sicily (Fig. 1): during its siege (415-414 BCE) the Athenian army surrounded the city by using planks and wooden frames

to cross the marshes ('History of the Peloponnesian war' VI:101). Similarly, marshes were used as strategic landscape elements for battles. At Thermopylae, where in 480 BCE the Spartans under Leonidas battled the Persians lead by Xerxes (Fig. 1), the latter had to move via a narrow passage between high cliffs and large coastal marshes (Herodotus, 'Histories' VII:176).
In battle, marshes could readily become deadly traps. According to Plutarch, Sulla drove the armies of Archelaus into the mires during the 85 BCE battle of Orchomenus (Copais area; Fig. 1). Afterwards, "the marshes were filled with blood, and the lake was filled with dead bodies", and nearly 200 years later (i.e. in Plutarch's time) weapons and armours could still be found ('Parallel lives' Sulla:21). Tacitus ('Annals' I; 'Histories' V:15-17) reported how in the 1st century CE during campaigns in Germania the Romans were on many occasions lured into marshes where the Germanic armies had the advantage.

Health

The relation between mires and health is twofold. First, there were the medicinal qualities of various plants, which were discussed elaborately by Theophrastus ('Enquiry into plants'), Dioscorides ('On medical matters') and Pliny the Elder ('Natural history'). On the other hand, it was thought that mires had a negative influence on human health, a thought which was widespread among the Romans but which already had emerged among ancient Greek authors.
In 'On airs, waters and places' – a text that has falsely been attributed to Hippocrates – ample text passages state that marshy places exhale foul vapours and smell terribly in summer. Cicero wrote in 'On the orator' (II:71.290) that the region of the Pontine marshes (Fig. 1) was neither pleasant nor healthy. Silius Italicus named that area the "pest-bringing Pontine" ('Punica' VIII:379). Strabo wrote how in the Nile delta "… cities, situated near lakes, have in the hot summer a heavy and suffocating atmosphere, and lakes shores become swampy… When a large quantity of moisture is emitted, a poisonous vapour rises that causes pestilential disorders" ('Geography' XVII:1.7). A remarkable passage in Varro ('On agriculture' I:12) seems to anticipate microbiology and epidemiology: "precautions must be taken near marshes… because certain minute creatures thrive there that are so small that they cannot be seen by eye, but that enter the body through the air inhaled by the mouth and nostrils, and cause dangerous diseases."
One of the – from a modern-day viewpoint - most bizarre passages on health comes from the Babylonian spell of the 'Worm and the tooth' (7th century BCE, but probably copied from a considerably older text). It was thought in ancient times that caries was caused by small worms gradually eating the teeth, a view that was widespread not only in Mesopotamia, but also in the Egyptian and Greek/Roman empires and far beyond from c. 4000 BCE up to the European Medieval (Paulissian 1993; Sabbatini & Fiorino 2016). The 'Worm and the tooth' explicitly states that the worm was created by marshes, i.e. a direct link was laid between wetlands and tooth decay. The reason for this link is unclear.

Human impact

Already in Antiquity marshes and wetlands were exploited by humans. This included the use of vegetation, especially of reedbed plants, as raw material for building, packaging, weaving, fodder, writing material, weapons, musical instruments and much more. The Sumerian god Enki greeted in 'Enki and the world order' the land of Meluḫa with the wish "may your reeds be great reeds". Similarly, the Sumerian proverb "where there are no reeds, it is the worst of all poverty" (Proverbs collection 3:106; collection 28:26) and the 'Song of Inana and Dumuzid (Dumuzid-Inana D1)' that wished for tall reedbeds illustrate that luxurious reeds were an aspect of wealth in ancient Sumer.
Aristotle ('Meteorology' II:3) wrote about the burning of salt marsh plants for the extraction of salt. He explained in the 'Rhetoric' (II:23.15) that the proverb "buying the marsh with the salt" referred to a situation that had both favourable and unfavourable aspects. Possibly this proverb relates to salt that contained impurities (such as clay or plant remains) from the marsh from where the salt was won.
The question arises whether peat extraction already took placed in ancient times. From the texts hitherto studied by us it appears that peat as a substance was neither known nor used, or at least nobody wrote about it. There is one exception: Pliny the Elder mentioned how the Chauci - a Germanic tribe in present-day north-western Germany that he had visited - used some kind of mud for cooking and heating: "they dried the mud collected with their hands more in the wind than in the sun, and the mud was burned for heating [i.e. cooking] food and [warming]

their bodies that were stiff from the northern cold" ('Natural history' 16:1.4). The fact that the mud was burnable, makes it most likely that it concerned peat. The use of the word "mud" by Pliny indicates that the substance was indeed unknown to the Romans and did not have its own name.

Reedlands were frequently used for hunting, primarily for food. Herodotus wrote in the 5th century BCE of people north of the Black Sea that hunted otters, beavers and some unidentified square-faced creatures in reedbeds along a large lake ('Histories' IV:109). Strabo ('Geography'VII:4.8) told in the 1st centuries BCE/CE about a neighbouring people that hunted deer and boars in marshes. Already in ancient Egypt hunting just for pleasure was common: an 'inscription of Sehetepibre' from the early 18th century BCE named this pharaoh the "overseer of pleasure-marshes". Many ancient Egyptian drawings and reliefs in temples and tombs display hunting scenes in papyrus thickets (see e.g. Simpson 1992; Herb 2001; Prisse d'Avennes 2018; Fig. 3). Ancient Egypts used papyrus reeds also for cattle herding, as told in e.g. the 'Fragment of a fantastic story' and 'The tale of the herdsman'.

Figure 3: Facsimile of an Ancient Egyptian fishing and fowling scene in papyrus reeds, depicting numerous different kinds of birds, fishes and some other animals, and stylised papyrus plants and water lilies/lotus. Whereas the men are fowling and fishing, the women collect lotus flowers. Tomb of Menna, Thebes (c. 1400-1350 BCE). Metropolitan Museum of Arts, New York.

Hydrological regulation of mires dates back to the beginnings of civilisation. According to Radner (2017) the earliest known constructions of dikes and canals in Mesopotamia stem from the seventh millennium BCE. The ancient Sumerian topographical name 'land of canals and reeds' (see above) indicates drainage, and also a text from the 'Royal inscriptions from Ur' states that marshlands of the town of Nina were reclaimed. Digging of ditches in reedlands played an important role in one of the Mesopotamian creation myths (see the next section).

In ancient Egypt, agriculture was practised in the floodplains of the Nile after the river had deposited fertile silt during the annual inundations. The agriculture connected to this flooding required an ingenious irrigation system, a thorough understanding of hydrological processes, as well as a central authority to plan, implement and manage the hydrological projects (Noaman & El Quosy 2017). Already the famous c. 3100 BCE macehead of the Scorpion king – who was one of the last predynastic rulers or the early dynastic king(s) Narmer/Menes (possibly but not necessarily two names for the same person) – displayed the king digging a ditch (Oakes & Gaglin 2002).

The summit of hydrological intervention is the complete drainage or filling-up of peatlands. Plutarch described in his 'Parallel lives' (Cimon:13) how Cimon had around 450 BCE dumped vast quantities of gravel and stones into the marshes around the city of Athens to facilitate the building of city walls.

The city of Rome was built - in-between and outside the famous seven hills - in floodplains of the river Tiber (Fig. 4). Major wetlands in the original city included the Velabrum maius (where the Circus Maximus was built) and the Velabrum minus (with the Forum Romanum), but in later times city expansion also urbanised the palus caprae ("goat's mire") on the martian fields and several mires at the west bank of the Tiber. Initially the city was plagued

by floods and water surplus in the inundated valleys. Varro ('The latin language' V:43) and Plutarch ('Parallel lives' Romulus:5) even described a ferry commuting between the hills during wet seasons.

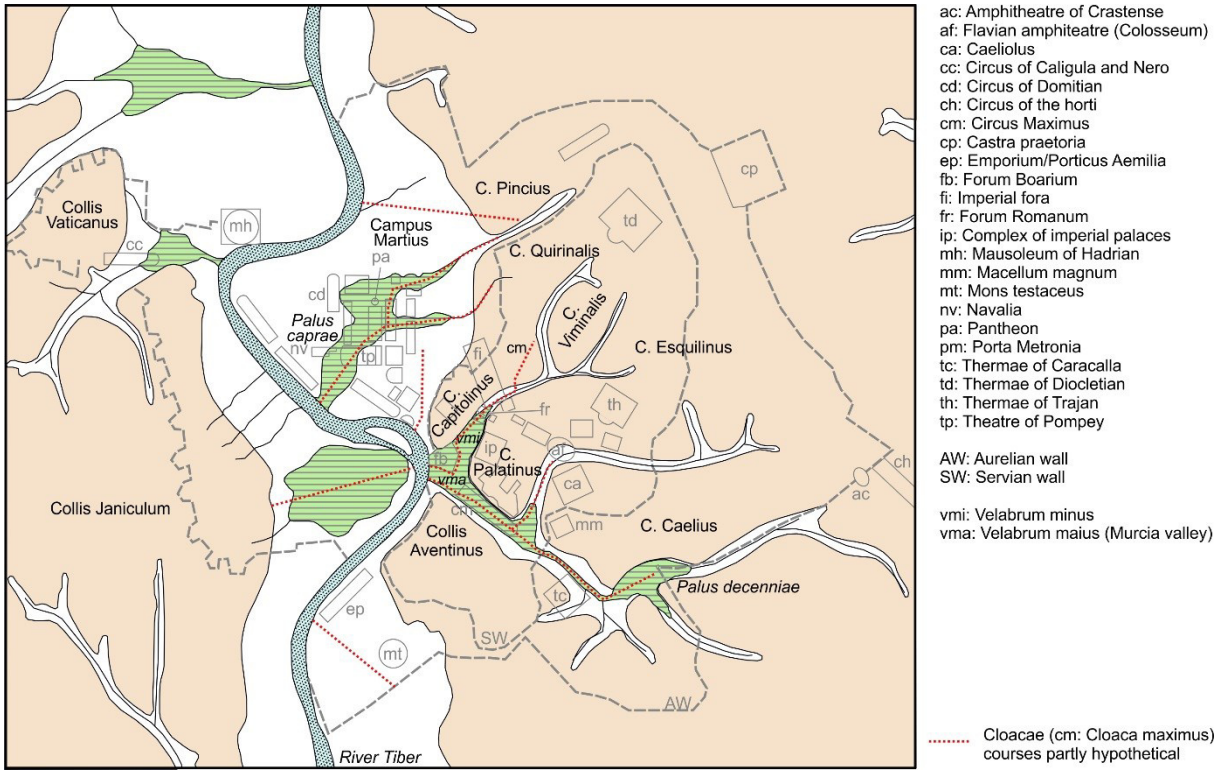

Figure 4: Map of ancient Rome, with higher elevated areas (yellowish brown), the river Tiber and its floodplains (white) and the floodplain wetlands (green-striped), after Corazza & Lombardi (1995); in grey (anachronistically) the main urban topography of ancient Rome (after Carandini & Carafa 2017); the locations of the cloacae are partly hypothetical.

According to Livy ('History of Rome' I:38), Lucius Tarquinius Priscus - the mythological 5th king of Rome – organised the construction of the cloaca maxima around 600 BCE to drain the forum and the Velabrum minus. In the course of time other cloacae were constructed to drain other parts of the city too (Fig. 4). The originally open cloacae were in later days overbuilt by randomly positioned buildings (Livy, 'History of Rome' V: 55), with as a result that nobody remembered the precise location of several of the cloacae anymore (Corazza & Lombardi 1995). The cloacae were primarily constructed for water discharge and were not used for sanitation purposes until the early imperial period (Corazza & Lombardi 1995). Despite these drains, floods regularly ravaged the city up to the times of the empire (Aldrete 2004). The marshy scenery that existed at the Forum Romanum prior to the construction of the cloacae was still remembered in early imperial time, when Ovid wrote in 'The festivals' (VI:395-418): "Here, where now the fora are located, once were wet swamps, and a ditch was dug to drain the superfluous water… once there was nothing except willows and hollow reeds… There was also a grove that was densely grown with rushes and reeds…".

A big frustration for the Romans were the Pontine marshes (pomptinae paludes; Fig. 1) south of Rome. These marshes cover a rather level plain and contain up to 60 m thick peat layers, which have accumulated over the last 20,000 years (Bragazza et al. 2017). Several Roman texts testify how numerous attempts to drain the region failed terribly. In the end, "draining the Pontine marshes" became a metaphor for a task impossible to accomplish (see e.g. Pliny the Elder: 'Natural history' XXVI:9; Quintilian: 'Institutes of Oratory' III:8.16).

In 282 CE the intention to drain a marsh became fatal for the Roman Emperor Probus. He did not want his soldiers to be idle and had already made them construct roads, bridges, canals, dikes and dams in Egypt ('Augustan history' Probus:9). When he ordered his men to drain and reclaim a marsh near Sirmium (Fig. 1), the soldiers - tired of doing civilian work - revolted and killed Probus.

Religious aspects

Black & Green (1992) prepared an overview of Mesopotamian deities, including various gods related to wetlands. Enki (Sumerian name, Ea in the Babylonian language) was a god of water and wetlands (Fig. 5), Gilimma (Sumerian name) or Marduk (Babylonian name) was a god of water and vegetation, Enkimdu (Sumerian name) the god of dikes and canals, and Ennugi (Sumerian name) was a lord of the dikes and canals as well as the divine canal inspector. Nanše (Sumerian name) was a goddess of marshes, fishes and birds. The great importance of marshes and reedlands for Mesopotamian societies is illustrated by the fact that creation myths stress that no marshes did exist before creation and that they belonged to the first landscapes to be created. The early 2nd millennium BCE Babylonian 'Another version of the creation of the world by Marduk' depicts how the god Marduk created dwelling places for humans by pouring soil on a bundle of reed. The Sumerian name Gilimma contains the word "gi" which means "reed", whereas the compound "gilim" may mean "foliage" or "rope of twined reeds" (see the 'The Pennsylvania Sumerian Dictionary'). In the Babylonian 17th century BCE 'Atrahasis' story that may have Sumerian roots, the minor gods Igigi (a name containing twice the word "gi"; the 'Pennsylvania Sumerian Dictionary' translates "igigi" as a not further specified "plant") had the task to dig canals in the reedlands. After doing this for numerous years they got so annoyed by this heavy burden that they rebelled against the higher gods. These subsequently created humans to take-over the tasks of the Igigi: i.e. humans were especially created for work in marshes.

Figure 5: Cylinder seal showing various Sumerian/Akkadian deities. The second figure from the right is the wetland god Enki, displayed with water streams and fishes along is shoulders and body. c. 2300 BCE. British Museum, London. ©Trustees of the British Museum. Shared under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0) licence.

Ancient Egyptian religion was highly complex. Among others, Oakes & Gahlin (2002) and Wilkinson (2017) published overviews. Numerous deities were depicted as humans, animals or inanimate objects. The same god could appear in different shapes under the same or under different names with different personalities, and these different manifestations could occur simultaneously and interact with each-other (i.e. with themselves or their alter-egos). Furthermore, various collectives of deities acted as unities, not as individuals. The god Horus was connected to the marshlands in the northern Nile delta where the goddess Isis had given birth to him. Wadjet was the goddess of the Nile delta and served as a nurse for Horus after his birth. Her name meant something like "green/the green one", or "she of the papyrus", since the ancient Egyptian word for the colour green was derived from one of the words for papyrus (cf. Dickson 2006). Also the early ancient Egyptian goddess Neith was connected to the Nile delta. Hathor was not only depicted as a human, but frequently also as a cow that roamed papyrus thickets (Fig. 6). Sobek – which means crocodile - was displayed as a crocodile or more frequently as a man with a crocodile head and was the god of water, marshes and riverbanks. Hapy was worshipped as the god of the Nile floods - i.e. not the river itself but only its annual inundation - and was generally shown with water plants on his head. Whereas Hapy was the Nile flood itself, Khnum was the god who regulated this flood.
There was no definite Egyptian creation myth (Oakes & Gahlin 2002): various tales initially only had a regional distribution, but later spread all over Egypt mixing with other stories. The different regional population groups of ancient Egypt were very tolerant towards religious views of their neighbours, embraced these and integrated them in their own beliefs. Various creation tales were related to wetlands. One tale describes how from the primordial waters a mound arose on which an egg was placed from which the sun ascended. Another tale tells

how the self-created god Atum appeared on a mound of fertile silt that arose above the water, after which Atum created the other gods. In yet another story a lotus or water-lily emerged from the waters and the sun arose from its flower. The myths of the mounds were probably modelled on the fertile land in the Nile valley that arose when the Nile withdraw after the annual floods. The opening of the lotus relates to the conspicuous opening and closing of the flowers at dawn and sunset, respectively, which in Egypt was often seen as a symbol of the sun - navigated by the god Re - that arose every morning and went down below the horizon in the evening. The Ptolemaic/Roman period 'Book of the Faiyum', that postdates the earlier creation myths with around two millennia, relates how in the Faiyum region (Fig. 1) a lake was excavated by primal gods, from which the god Nun arose who created Amun who in turn overtook the rest of creation.

Figure 6: The ancient Egyptian goddess Hathor in the shape of a cow descending into the papyrus marshes from a stylised mountain, and a hippopotamus goddess with lotus/water lily offerings. From the Book of the Dead on the Papyrus of Ani, c. 1250 BCE. British Museum, London. ©Trustees of the British Museum. Shared under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0) licence.

Also the ancient Egyptian views on afterlife were variable and changed over time. The final destination for the deceased was the sekhet aaru, which is difficult to translate. "Sekhet" can mean "field" or "marshland", "aaru" translates as "reeds" or "rushes" (cf. Budge 1920; Dickson 2006). Furthermore, there was the sekhet hetep, of which the latter word translates as "offering", "rest", or "peace", but also signifies the state of "being at peace", "being at rest", or "being satisfied" (Dickson 2002). The religious sources are inconsistent on whether sekhet aaru was part of sekhet hetep, sekhet hetep was part of sekhet aaru, or whether both were independent of each other. Drawings of both areas on coffins and papyri after the 2nd millennium BCE display ample interconnected water courses resembling the Nile delta within a predominantly cultural setting (see the quoted editions of the 'Coffin texts' and the 'Book of the dead'). Since there is a gap of 500-1000 years between the first use of the terms in the 'Pyramid texts' of the Old Kingdom (mid/late 3rd Millennium BCE) and the coffins and papyri of the Middle and New Kingdoms, an original religious concept of (partly) natural wetland may have changed into an agricultural setting when increasing population in Egypt caused a decrease of natural floodplain marshes along the Nile. Anyhow, the road to the afterlife realms was long and dangerous and led through many wetlands, and

the well-known 'Pyramid texts', 'Coffin texts' and 'Book of the dead' present ample instructions and spells how to pass them unharmed.
Greek and Roman mythology included many minor divinities (e.g. nymphs) of specific rivers or lakes/marshes, but deities exclusively dedicated to mires and peatlands as general landforms were obviously not worshipped. Yet the love goddess Aphrodite was incidentally named "the one of the rushes" and Dionysus was once designated "the lake dweller/marsh dweller" (Liddell & Scott 1961). Strabo mentioned temples of "Artemis in the swamps" and of "Artemis in the lake/marsh" ('Geography' VIII:3.5; VIII:4.9). Five rivers that connected to the Greek/Roman underworld were regularly named marshes rather than rivers: Styx, Acheron, Lethe, Phlegeton, Cocytus; the sixth underworld water was the world-surrounding Oceanus. The Romans detested their afterlife marshes: Ovid, for example, wrote how Jupiter had wished a nymph to the infernal marshes ('The festivals', II:610). Seneca the Younger wrote in 'The madness of Hercules' (verses 685/781) about the "awful motionless swamp of Cocytus" and the "farthest swamps of the Styx", and Virgil mentioned "the reeds of the terrible swamp of the Cocytus" ('Georgics' IV:478-480).

Mires and sexuality

A connection between wetlands and sexuality may initially appear somewhat strange, but there are various wetland-related stories with a highly erotic content. Especially Sumerian texts were often explicitly sexual (cf. Leick 1994).
A Sumerian proverb of 'collection 4' states that a non-erect hanging penis - after a full day of ejaculating – was nothing more than a "damp reed". In the Sumerian story of 'Enki and Ninḫursaĝ', the wetland god Enki sprayed his sperm in the marshes to fill them with water (note: there are translations in which he did not use his penis for masturbation, but for the digging of ditches and building of dikes), and subsequently had sex with Ninḫursaĝ and impregnated her. He seduced her with a phrase that translates like "lay down in the reeds, lay down in the reeds, we will enjoy it". Ninḫursaĝ gave birth to Ninmu, and Enki – while watching his daughter from out of his reed thickets – became aroused again and impregnated her also. Ninmu gave birth to Ninkurra, and the story repeated itself. The sequence of incestuous intercourses ended after the birth of Uttu, the daughter of Ninkurra and Enki, but Enki and Ninḫursaĝ got several other children in the remaining part of the tale, including the wetland goddess Nanše (mentioned above).
In one of the ancient Egyptian 'Songs from an orchard' it is stated that a girl would give the boy a day of "pleasure in the shelter of reeds". One of the 'Love poems on shards of a shattered vase' tells how a young man sighed that he missed his beloved and that "The reed had dried-out, the thistle had faded, and the marsh flowers grew in the bush", which seems to reflect the sexual organs of the boy and the girl that remained unused as long they were parted. In the 'tale of the herdsman' an unidentified goddess tried to seduce a cowherd in the reedbeds twice, but because the text has been preserved only fragmentarily the precise content of the text is unclear.
These examples demonstrate that the riverine reedlands of Mesopotamia and Egypt were regarded very erotic landscapes. This was also considered by the early Christian theologist Clement of Alexandria (2nd century CE), who, however, had a less positive attitude. He stated that the "exhalations of the earth and the marshes [that] gather into mists and clouds" were similar to "the vapours of the fleshy lust that brings an evil condition to the soul" ('Miscellanies', II:20). In this text, thus, a direct link was made between the sexual act - that was seen by him as something despicable - and marshes - that were appalling and unhealthy in Roman culture.

Outlook

At present, we have processed some 450 works from antiquity, and most likely the number will eventually be doubled. Main trends, however, are already apparent.
In ancient Mesopotamia the extensive wetlands of the rivers Euphrates and Tigris were seen as something beautiful, which relates to the fact that Mesopotamian societies were strongly dependent on the wetlands for raw material, food and daily life in general. However, the link between marshes and tooth decay shows that some negative connections were also perceived. In ancient Egypt, similarly, societal focus was completely on the river Nile and its floodplains. In the secular literature seen by us the wetlands were mainly part of the scenery and not something special. In Egyptian religion, however, wetlands were very dominant, culminating in the marshes of afterlife. Whereas ancient Greek literature seems to have had a rather neutral to slightly negative attitude towards wetlands, the Romans completely detested such landscapes. This may relate to the difficulties

the city of Rome had with the mires in the floodplain of the river Tiber, the failing drainage of the Pontine marshes, and later to the limited success in battle in the extensive peatland regions to the north of the empire. All societies developed the necessity for wetland management which resulted in ingenuous hydrologic technology. It is safe to assume that the mires and wetlands played an important – if not crucial – role in the technical, agricultural and social development of the various civilisations.

Next to the series of short papers we have started in the IMCG Bulletin (De Klerk 2019a/b; Joosten 2019), we plan to present the detailed referenced results of our studies in a collection of papers covering the various thematic aspects. It would be interesting and valuable to extend this kind of research to other areas where ancient literature or visual art may give information on the role of mires and wetlands in past societies, and we hope to encourage experts from all over the world to join our initiative. This will result in a diverse overview of the crossroads between nature and culture, will enrich both natural and social sciences/humanities, and will advance the appreciation of these fascinating landscapes.

Quoted texts from Antiquity

Texts without known author:

Another version of the creation of the world by Marduk (date not clear, probably post-Sumerian period). – English translation by King, L.W.: The seven tablets of creation or the Babylonian and Assyrian legends concerning the creation of the world and of mankind. Vol. I English translations, etc. Luzac & Co., London, 1902.

Atrahasis (17th century BCE). – English translation by Dalley, S.: Myths from Mesopotamia. Creation, the flood, Gilgamesh, and others. Oxford University Press, Oxford, 2008.

Book of the dead (after c. 1500 BCE continuously expanding). – German translation by Hornung, E.: Das Totenbuch der Ägypter. Artemis Verlag, Zürich/München, 1979. – English translation by Faulkner, R. (edited by Goelet, O.): The Egyptian book of the dead, the book of going forth by day. Chronicle Books, San Francisco, 1998. - English translation by Budge, E.A.W.: The Egyptian Book of the Dead. Penguin, London, 2008.

Book of the Faiyum (Ptolemaic to Roman period). – Original text and German translation by Beinlich, H.: Das Buch vom Fayum. Zum religiösen Eigenverständnis einer ägyptischen Landschaft (two volumes). Otto Harrasowitz, Wiesbaden, 1991.

Coffin texts (starting in the late 3rd Millennium BCE and continuously expanding). - Original texts by De Buck, A.: The Egyptian coffin texts. The University of Chicage Press, Chicago, 7 volumes published between 1935 and 1954. – English translation by Faulkner, R.O.: The ancient Egyptian coffin texts Volume I spells 1-354. Aris & Phillips Ltd, Warminster, 1973. The ancient Egyptian coffin texts Volume II spells 355-787. Aris & Phillips Ltd, Warminster, 1977. The ancient Egyptian coffin texts Volume III spells 788-1185. Aris & Phillips Ltd, Warminster, 1978.

Enki and Ninḫursaǧ (Sumerian period). – Original transliterated text and English translation by Kramer, S.N.: Enki and Ninhursag, a Sumerian "paradise" myth. Bulletin of the American Schools of Oriental Research Supplementary Studies No. 1. American Schools of Oriental Research, New Haven, 1945. – English translation by Cunningham, G. in: Black, J.A., Cunningham, G., Ebeling, J., Flückiger-Hawker, E., Robson, E., Taylor, J., and Zólyomi, G.: The electronic text corpus of Sumerian literature (http://etcsl.orinst.ox.ac.uk/), Oxford 1998–2006.

Enki and the world order (Sumerian period). – English translation by Black, J.A., in: Black, J.A., Cunningham, G., Ebeling, J., Flückiger-Hawker, E., Robson, E., Taylor, J., and Zólyomi, G.: The electronic text corpus of Sumerian literature (http://etcsl.orinst.ox.ac.uk/), Oxford 1998–2006.

First Campaign of Sennacherib (Assyrian, after c. 700 BCE). – English translation by Smith, S.: The first campaign of Sennacherib, king of Assyria, B.C. 705-681. Luzac & Co., London, 1921.

Fragment of a fantastic story (c. 2000-1800 BCE). - French translation by Maspero, G. subsequently translated into English by Johns, C.H.W.: Popular stories of Ancient Egypt. G.P. Putnam's sons, New York / H. Grevel & Co., London, 1915.

Inscription of Sehetepibre (c. 1780 BCE). – English translation by Breasted, J.H.: Ancient records of Egypt. Historical documents from the earliest times to the Persian conquest. Volume I the first to the seventeenth dynasty. The University of Chicago Press, Chicago / Luzac & Co., London; Otto Harrassowitz, Leipzig, 1906.

Love poems on shards of a shattered vase (1200-1180 BCE). - German translation by Schlögl, H.A.: Gärten der Liebe. Lyrik aus der Zeit der Pharaonen. Artemis & Winkler, Düsseldorf, 2000.

Proverbs collections 3, 4 & 28. – English translation by Taylor, J., in Black, J.A., Cunningham, G., Ebeling, J., Flückiger-Hawker, E., Robson, E., Taylor, J., and Zólyomi, G.: The electronic text corpus of Sumerian literature, (http://etcsl.orinst.ox.ac.uk/), Oxford 1998–2006.

Pyramid texts (c. 2350-2150 BCE). – English translation of the texts of the pyramids of Unis, Teti, Pepi I, Merenre, Pepi II and Neith by Allen, J.P.: The ancient Egyptian pyramid texts. Society of Biblical Literature, Atlanta, 2005. – English translation by Faulkner, R.O.: The ancient Egyptian pyramid texts. Digireads.com Publishing, Stilwell, 2007.

Royal Inscriptions from Ur (date unclear). – English translation by Gadd, C.J.: Ur excavations texts I: royal inscriptions. British Museum, London / University of Pennsylvania, Philadelphia, 1928.

Songs of the orchard – the Turin love songs (date unclear). - English translation by Tobin, V.A. in Simpson, W.K. (ed.): The literature of Ancient Egypt. Yale University Press, New Haven/London, 2003.

Song of Inana and Dumuzid (Dumuzid-Inana D1) (Sumerian, late 3rd/early 2nd millennium BCE). – English translation by Black, J.A. in: Black, J.A., Cunningham, G., Ebeling, J., Flückiger-Hawker, E., Robson, E., Taylor, J., and Zólyomi, G.: The electronic text corpus of Sumerian literature, (http://etcsl.orinst.ox.ac.uk/), Oxford 1998–2006.

Tale of the Herdsman (c. 20th century BCE). – Transliteration and English translation by Schneider, T.: Contextualising the tale of the herdsman. In: Schneider, T. & Szpakowska, K. (eds.): Egyptian stories. A British Egyptological tribute to Alan B. Lloyd on the occasion of his retirement. Ugarit-Verlag, Münster, 2007.

The worm and the tooth (Neo-Babylonian times, possibly earlier). – English translation by Speiser, E.A., in: Pritchard, J.B. (ed.): Ancient near Eastern texts relating to the Old Testament, third edition. Princeton University Press, Princeton, 1969.

Texts of known authors:

Aristotle (Ἀριστοτέλης, 384–322 BCE): Μετεωρολογικά (Meteorology). Original text and English translation by Webster, E.W.: Complete works of Aristotle. Delphi Classics, Hastings, 2013 (kindle edition).

Aristotle (Ἀριστοτέλης, 384–322 BCE): Περὶ ζῴων γενέσεως (On the generation of animals). - Original text and English translation by Platt, A.: Complete works of Aristotle. Delphi Classics, Hastings, 2013 (kindle edition).

Aristotle (Ἀριστοτέλης, 384–322 BCE): Περὶ ζῴων μορίων (Parts of animals). - Original text and English translation by Peck, A.L.: Parts of animals, Movement of animals, progression of animals. Loeb Classical Library, Harvard University Press, Cambridge / William Heinemann Ltd, London, 1961. - Original text and English translation by Ogle, W.: Complete works of Aristotle. Delphi Classics, Hastings, 2013 (kindle edition).

Aristotle (Ἀριστοτέλης, 384–322 BCE): Ῥητορική (Rhetoric). - Original text and English translation by Roberts, W.R.: Complete works of Aristotle. Delphi Classics, Hastings, 2013 (kindle edition).

Aristotle (Ἀριστοτέλης, 384–322 BCE): Τῶν περὶ τὰ ζῷα ἱστοριῶν (History of animals). - Original text and English translation by Thompson, D.W.: Complete works of Aristotle. Delphi Classics, Hastings, 2013 (kindle edition).

Caesar (Gaius Julius Caesar; 100-44 BCE): De bello Gallico (About the Gallic war). - Original text and German translation by Deissmann, M.: De bello Gallico der Gallische Krieg. Reclam, Stuttgart, 2004. - Original text and English translation by MacDevitt, W.A.: Complete works of Julius Caesar. Delphi Classics, Hastings, 2013 (kindle edition).

Cicero (Marcus Tullius Cicero, 106-43 BCE): De oratore ad Quintum fratrem libri tres (On the orator). - Original text and English translation by Watson, J.S.: Complete works of Cicero. Delphi Classics, Hastings, 2014 (kindle edition).

Clement of Alexandria (Titus Flavius Clemens/Κλήμης ὁ Ἀλεξανδρεύς; c. 150–c. 215 CE): Στρώματα (Miscellanies). - Original text and English translation by Wilson, W.: Complete works of Clement of Alexandria. Delphi Classics, Hastings, 2016 (kindle edition).

Dioscorides (Πεδάνιος Διοσκουρίδης; c. 40–90 CE): Περὶ ὕλης ἰατρικῆς (On medical matters). - Original text and Latin translation by Sprengel, C.: Pedanii Dioscoridis anazarbei de material medica. Lipsia (Leipzig), 1829. - English translation by Osbaldeston, T.A. & Wood, R.P.A.: De material medica, being an herbal with many other medicinal materials written in Greek in the first century of the common era. Ibidis Press, Johannesburg, 2000.

Herodotus (Ἡρόδοτος; c. 484-425 BCE): Ἱστορίαι (Histories). - English translation by Waterfield, R.: The Histories. Oxford University Press, Oxford, 1998. - Original text and English translation by Godley, A.D.: Complete works of Herodotus. Delphi Classics, Hastings, 2015 (kindle edition).

Hippocrates (Ἱπποκράτης ὁ Κῷος, c. 460–c. 370 BCE; probably by another unknown author): Περὶ ἀέρων, ὑδάτων, τόπων (On airs, waters, and places). – Original text and English translation by Adams, C.D.: Complete works of Hippocrates. Delphi Classics, Hastings, 2015 (kindle edition).

Josephus (מתתיהו בן יוסף / Yosef ben Matityahu / Titus Flavius Josephus / Φλάβιος Ἰώσηπος; 37–c. 100 CE): Φλαυίου Ἰωσήπου ἱστορία Ἰουδαϊκοῦ πολέμου πρὸς Ῥωμαίους βιβλία (War of the Jews). - Original text and English translation by Whiston, W.: Complete works of Josephus. Delphi Classics, Hastings, 2014 (kindle edition).

Livy (Titus Livius Patavinus; 65/59 BCE-12/17 CE): Ab urbe condita libri (History of Rome). - Original text and English translations by Foster, B.O. & McDevitte, W.A.: Complete works of Livy. Delphi Classics, Hastings, 2014 (kindle edition).

Ovid (Publius Ovidius Naso; 43 BCE-17/18 CE): Fasti (The Festivals). - Original text and English translation by Frazer, J.G.: Complete works of Ovid. Delphi classics, Hastings, 2012 (kindle edition).

Pliny the Elder (Gaius Plinius Secundus; 23-79 CE): Naturalis Historia (Natural History). - German translation by Wittstein, G.C.: Die Naturgeschichte des Caius Plinius Secundus (two volumes). Marix Verlag, Wiesbaden, 2007. - Original text and English translation by Bostock, J. & Riley, H.T.: Complete works of Pliny the Elder. Delphi Classics, Hastings, 2015 (kindle edition).

Plutarch (Πλούταρχος / Lucius Mestrius Plutarchus; c. 46-120 CE): Βίοι Παράλληλοι (Parallel lives). - Original text and English translation by Perrin, B.: Complete works of Plutarch. Delphi Classics, Hastings, 2013 (kindle edition).

Quintilian (Marcus Fabius Quintilianus; c. 35– c. 100 CE): Institutio Oratoria (Institutes of Oratory). – Original text and English translation by Butler, H.E.: Complete works of Quintilian. Delphi Classics, Hastings, 2015 (kindle edition).

Scriptores Historiae Augustae (after 300 CE): Historia Augusta (Augustan history). – Original text and English translation by Ballou, S.H.: Complete works of Suetonius. Delphi Classics, Hastings, 2016 (kindle edition).

Seneca the Younger (Lucius Annaeus Seneca; c. 4 BCE-65 CE): Hercules furens (the madness of Hercules). - Original text and English translation by Miller, F.J.: Complete works of Seneca the Younger. Delphi Classics, Hastings, 2014 (kindle edition).

Silius Italicus (Tiberius Catius Asconius Silius Italicus; c. 28– c. 103 CE): Punica. Original text and English translation by Duff, J.D.: Complete works of Silius Italicus. Delphi Classics, Hastings, 2015 (kindle edition).

Strabo (Στράβων 64/63 BCE–c. 24 CE): Γεωγραφικά (Geography). - German translation by Forbiger, A.: Geographica. Marix Verlag, Wiesbaden, 2005. - Original text and English translation by Hamilton, H.C. and Falconer, W.: Complete works of Strabo. Delphi Classics, Hastings, 2016 (kindle edition).

Tacitus (Publius Cornelius Tacitus, c. 56-c. 120 CE): Ab Excessu divi Augusti Historiarum Libri (Annals). - German translation by Sontheimer, W.: Annalen I-VI. Reclam, Stuttgart, 1964. Annalen XI-XVI: Reclam, Stuttgart, 1967. - Original text and English translation by Jackson, J.: Complete works of Publius Cornelius Tacitus. Delphi Classics, Hastings, 2014 (kindle edition).

Tacitus (Publius Cornelius Tacitus, c. 56-c. 120 CE): De origine et situ germanorum (Germania). – English translation by Mattingly, H. and Handford, S.A.: The Agricola and the Germania. Penguin, London, 1970. – Original text and English translation by Aikin, J.: The complete works of Publius Cornelius Tacitus. Delphi Classics, Hastings, 2014 (kindle edition). - Original text and German translation by Fuhrmann, M.: Germania. Reclam, Stuttgart, 2016.

Tacitus (Publius Cornelius Tacitus, c. 56-c. 120 CE): De vita et moribus Iulii Agricolae (Agricola). - English translation by Mattingly, H. and Handford, S.A: The Agricola and the Germania. Penguin, London, 1970. - Original text and English translation by Aikin, J.: Complete works of Publius Cornelius Tacitus. Delphi Classics, Hastings, 2014 (kindle edition).

Tacitus (Publius Cornelius Tacitus, c. 56-c. 120 CE): Historiae (Histories). - Original text and German translation by Vretska, H.: Historien. Reclam, Stuttgart, 1984. - Original text and English translation by Moore, C.H.: Complete works of Publius Cornelius Tacitus. Delphi Classics, Hastings, 2014 (kindle edition).

Theophrastus (Θεόφραστος, c. 371–c. 287 BCE): Περὶ φυτῶν αἰτιῶν (On the causes of plants). - Original text and English translation by Einarson, B. & Link, G.K.K.: De causis plantarum I. Loeb Classical Library, William Heinemann Ltd., London / Harvard University Press, Cambridge, 1976. De causis plantarum Books III-IV. Loeb Classical Library, Harvard University Press, Cambridge / London, 1990; De causis plantarum Books V-VI. Loeb Classical Library, Harvard University Press, Cambridge / London, 1990.

Theophrastus (Θεόφραστος, c. 371–c. 287 BCE): Περὶ φυτῶν ἱστορία (Enquiry into plants). - Original text and English translation by Hort, A.: Enquiry into plants and minor works on odours and weather signs I. Loeb Classical Library, William Heinemann Ltd., London / Harvard University Press, Cambridge, 1968. Enquiry into plants and minor works on odours and weather signs II. Loeb Classical Library, Harvard University Press, Cambridge / William Heinemann Ltd., London, 1961.

Thucydides (Θουκυδίδης, c. 460-c. 400 BCE): Ἱστορίαι (History of the Peloponnesian war). - Original text and English translation by Jowett, B.: Complete works of Thucydides. Delphi Classics, Hastings, 2013 (kindle edition).

Varro (Marcus Terentius Varro; 116-27 BCE): De lingua Latina libri (On the Latin language). - Original text and English translation by Kent, R.G.: Complete works of Varro. Delphi Classics, Hastings, 2017 (kindle edition).

Varro (Marcus Terentius Varro; 116-27 BCE): Rerum rusticarum libri tres (on agriculture). - Original text and English translation by Hooper, W.D. (revised by Ash, H.B.): Complete works of Varro. Delphi Classics, Hastings, 2017 (kindle edition).

Virgil (Publius Vergilius Maro; 70-19 BCE): Georgicon (The georgics). – Original text and English translation by Rushton Fairclough, H.: Virgil I Eclogues, Georgics, Aeneid I-VI. Loeb Classical Library, William Heinemann, London / G.P. Putnam's sons, New York, 1916: 80-237. - Original text and English translation by Greenough, J.B.: Complete works of Virgil. Delphi Classics, Hastings, 2014 (kindle edition).

References

Aldrete, G.S. (2004): Daily life in the Roman city: Rome, Pompeii, and Ostia. Greenwood Press, Westport/London.

Arnold, D. (1995). An Egyptian bestiary. The Metropolitan Museum of Art Bulletin Spring 1995: 1-64.

Berglund, B.E. (ed.) (1986): Handbook of Holocene Palaeoecology and Palaeohydrology. Wiley, Chichester.

Birks, H.J.B. & Birks, H.H. (1980): Quaternary Palaeoecology. Edward Arnold, London.

Black, J. & Green, A. (1992): Gods, demons and symbols of ancient Mesopotamia. The British Museum press, London.

Bragazza, L., Lasen, C., Gerdol, R. & Novello, E. (2017): Italy. In: Joosten, H., Tanneberger, F. & Moen, A. (eds.): Mires and peatlands of Europe. Status, distribution and conservation. Schweizertbart Science Publishers, Stuttgart: 462-477. doi: 10.1127/mireseurope/2017/0001-0035.

Budge, E.A.W. (1920): An Egyptian hieroglyphic dictionary. Volume I. John Murray, London.

Carandini, A. & Carafa, P. (eds.) (2017): The atlas of ancient Rome. Biography and Portraits of the city. 2. Tables and indexes. Princeton University Press, Princeton / Oxford.

Christanis, K. (2017): Greece. In: Joosten, H., Tanneberger, F. & Moen, A. (eds.): Mires and peatlands of Europe. Status, distribution and conservation. Schweizertbart Science Publishers, Stuttgart: 425-431. doi: 10.1127/mireseurope/2017/0001-0031.

Corazza A., & Lombardi L. (1995): Idrogeologia dell'ares del centro storico. In: Funiciello, R. (ed.): La geologia di Roma. Mem. Descr. Della Carta Geol. D'It., 50: 173-211.

De Klerk, P. (2019a): Peatland prose from the past: the trembling soils of Pliny the Elder (23-79 CE). IMCG Bulletin February-March 2019: 3.

De Klerk, P. (2019b): Peatland prose from the past: the indulgent and exorbitant mires of St. Ambrose (340-397 CE). IMCG Bulletin April 2019: 2-3.

De Klerk, P., Haberl, A., Kaffke, A., Krebs, M., Matchutadze, I., Minke, M., Schulz, J. & Joosten, H. (2009): Vegetation history and environmental development since ca. 6000 cal yr BP in and around Ispani 2 (Kolkheti lowlands, Georgia). Quaternary Science Reviews 28: 890-910. doi: 10.1016/j.quascirev.2008.12.005.

Dickson, P. (2006): Dictionary of middle Egyptian in Gardiner classification order. https://archive.org/details/DictionaryOfMiddleEgyptian.

Ferrari, K., Bellotti, P., Dall'Aglio, P.L., Davoli, L., Marta, M. & Torri, P. (2013): Wetlands in the river delta plains: evolution, values and functions during the Roman times. The coastal landscape close to the Garigliano river mouth. Géocarrefour 88: 273-283.

Herb, M. (2001): Der Wettkampf in den Marschen. Quellenkritische, naturkundliche und sporthistorische Untersuchungen zu einem altägyptischen Szenentyp. Nikephoros Beihefte 5. Weidmannsche Verlagsbuchhandlung, GmbH, Hildesheim.

Hilprecht, H.V. (1896): Old Babylonian inscriptions chiefly from Nippur. Part II. The Babylonian Expedition of the University of Pennsylvania Series A: cuneiform texts Volume I part II. University of Pennsylvania, Philadelphia.

Joosten, H. (2019): Word from the Secretary-General. IMCG Bulletin April 2019: 2.

Joosten, H. & De Klerk, P. (2002): What's in a name? Some thoughts on pollen classification, identification, and nomenclature in Quaternary palynology. Review of Palaeobotany and Palynology 122: 29-45. doi: 10.1016/S0034-6667(02)00090-8.

Joosten, H., Couwenberg, J., Moen, A. & Tanneberger, F. (2017): Mire and peatland terms and definitions in Europe. In: Joosten, H., Tanneberger, F. & Moen, A. (eds.): Mires and peatlands of Europe. Status, distribution and conservation. Schweizertbart Science Publishers, Stuttgart: 65-96. doi: 10.1127/mireseurope/2017/0001-0005.

Kantor, E.J. (1999): Plant ornament in the ancient Near East: A Case of Cultural Exchange. PhD-thesis, University of Chicago. https://oi.uchicago.edu/research/research-archives-library/dissertations/plant-ornament-its-origin-and-development-ancient.

Leick, G. (1994): Sex and Eroticism in Mesopotamian literature. Routledge, London/New York.

Liddell, H.G. & Scott, R. (1961; revised by Jones, H.S.): A Greek-English lexicon. Clarendon Press, Oxford.

Lordkipanidze, O. (1996): Das alte Georgien (Kolchis und Iberien) in Strabons Geographie. Neue Scholien. Verlag Adolf M. Hakkert, Amsterdam.

Lordkipanidze, O. (2000): Phasis the river and city in Colchis. Franz Steiner Verlag GmbH, Stuttgart.

Noaman, M.N. & El Quosy, D. (2017): Hydrology of the Nile and ancient agriculture. In: Satoh, M. & Aboulroos, S. (eds.): Irrigated agriculture in Egypt. Past, present and future. Springer, Basel: 9-28.

Oakes, L. & Gahlin, L. (2002): Ancient Egypt. An illustrated reference to the myths, religions, pyramids and temples of the land of the pharaohs. Hermes House, London.

Paulissian, R. (1993): Dental care in ancient Assyria and Babylonia. Journal of the Assyrian Academic Society 7: 96-116.

Pennsylvanian Sumerian Dictionary: http://psd.museum.upenn.edu/.

Pommerening, T., Marinova, E. & Hendrickx, S. (2010): The early dynastic origin of the water-lily motif. Chronique d'Égypte 85: 14-40. doi: 10.1484/J.CDE.1.102018.

Prisse d'Avennes, E. (2018): Egyptian Art – Ägyptische Kunst – Art égyptien. Complete plates from – Sämtliche Tafeln von –Toutes les planches de Monuments égyptiens & Histoire de l'art égyptien. Taschen GmbH, Köln.

Radner, K. (2017). Mesopotamien. Die frühen Hochkulturen an Euphrat und Tigris. Verlag C.H. Beck, München.

Sabbatini, S. & Fiorino, S. (2016): Dental worm disease. Le infezioni in Medicina 4: 351-360.

Simpson, W.K. (1992): The offering chapel of Kayemnofret in the Museum of Fine Arts, Boston. Department of Egyptian and ancient Near Eastern Art, Museum of Fine Arts, Boston.

Wheat, E.R.J. (2012): Terrestrial cartography in ancient Mesopotamia. PhD-thesis, University of Birmingham.

Wilkinson, R.H. (2017): Complete gods and goddesses of ancient Egypt. Thames & Hudson, London.