

## Aquatic Plants in Arid Places

Wetland plants are one of my specialties. They are important in my home area on the shores of the largest estuary in the world, Chesapeake Bay. Marshes, swamps, bogs and a diversity of other wetlands surround me. What a contrast to living in Jordan where water itself is a sort of endangered species! Scarcity of water is a fact of life in most of the Middle East.

So, it is not surprising that few wetland plants are mentioned in the Bible since wetlands occupy such a small percentage of the area. Jordan is about 80% desert and the rest of the country is also dry. Under such conditions, wetlands in semi-arid Bible lands are well defined. Take for example oases and rivers. Both are familiar images in the Bible.

Plants associated with these wetlands are few yet interesting. Some confusion exists over their identity. Cane (qaneh in Hebrew) is an example. Of the references to qaneh in four books of the Old Testament, the plant most frequently referred to is probably *Arundo donax* or giant cane. It is ubiquitous where any fresh water is found. Especially evident on hillsides, it marks a place where there is water even if it is below the surface of the soil. Technically, it is not an aquatic plant but rather a species that must grow near water where its feet are wet.

Giant cane can be tall, up to 6m. Stems are unbranched, straight and woody. Because of this, giant cane is used in construction of huts, walls, fences, and to make simple flutes or writing pens. It was also used as a measuring instrument, a kind of yard or meter stick in ancient times. An example is the man with the measuring reed in his hand in Ezekiel 40, 41 and 42. Apparently, this is giant cane because of its durability and utility.

In Exodus 30 in the compounding of the anointing oil, the same word is used, qaneh. Clearly a different plant is intended here, a fragrant cane. The word is translated as calamus,

referring to *Acorus calamus* from which a perfume base is extracted.

In the New Testament, the Greek word *kalamos*, from which the Latin *Calamus* is derived, is used for cane or reed in such passages as Matthew 11: 48 where a sponge of vinegar was offered to Jesus on the cross and Mark 15: 19 where the reed was used for beating. In both cases, the plant that best fits the description is giant cane due to its length and strength.

Kalamos is translated "pen" in III John 13-"I have much to write to you, but I do not want to do so with pen and ink." With a sharpened point, a piece of giant reed makes a writing instrument. Passages in Revelation with the same word refer to measuring akin to the Ezekiel verses and are likely the same plant rather than common reed which is not as strong and stiff.

Common reed, *Phragmites australis*, like giant reed, is also a member of the grass family though characteristically found in wetter sites. It is one of the few plants that grows throughout most of the world. Large stands are found in the Delta of the Danube near the Black Sea. In North America, the same species has developed especially aggressive races that are destroying some natural wetlands. Common reed is frequent throughout the Middle East. Reaching a height of 4m, it is a hardy plant of marshes though not as vigorous as giant cane.

Jeremiah 51:31-32 is a graphic description of battles in Babylon, a city located along rivers with marshes. "One courier follows another and messenger follows messenger to announce to the king of Babylon that his entire city is captured, the river crossings seized, the marshes set on fire and the soldiers terrified." The word marsh in the NIV is *agam*. Babylon's marshes may have been dominated by common reed that forms dense stands along rivers and in oases.

One such oasis is the famed Azraq Oasis in Jordan that has suffered from reckless draining in recent years. Further damage has been incurred by the removal of water for the city of Amman. The permanent lakes at Azraq made it the largest oasis within thousands of square kilometers of desert. With a lowering of the water table, common reed invaded and today forms the dominant vegetation in the vastly reduced oasis, which, ironically, must be maintained by pumping water into the oasis.

March 19 was a bright, still day when I visited Azraq Oasis with other biologists. Concerned about the overwhelming dominance of *Phragmites* that crowded out other more desirable species and lowered diversity of plants and animals, we surveyed the area and then left for the Azraq Preserve office on a low hill overlooking the marsh. Suddenly the sky was filled with billows of black smoke from the marsh. The stand of common reed was ablaze. Rushing to the fire we were rebuffed by the roar and heat. As the reed burns, water vapor builds up in the stem causing a popping sound. Imagine the soldiers at the margin of the marsh in Jeremiah 51 terrified as the marsh burns out of control!

While giant cane and common reed are the most widespread of Bible wetland plants, perhaps the best known is bulrush mentioned in the story of baby Moses (Exodus 2) where the child was hid in the vegetation along the Nile River.

Still common in parts of the Nile, bulrush or papyrus (*Cyperus papyrus*), is also found throughout much of Africa. Papyrus is the source of the English word paper. Pounding the soft stems together made paper. Resembling a grass but in a related family, papyrus has a round stem several meters tall that bears a spherical mass of tiny flowers on long, flexuous stalks at the top.

The thick stems are filled with cells that contain air, and may be the reason it is called *agam* (with variations), meaning absorbent in Hebrew. In some places, i.e. Exodus 2:3, 5 papyrus is used for cuwph.

This absorbency caused by the large air spaces provided buoyancy in making boats. In an apparent reference to the Nile, Isaiah 18:1-2 refers to these boats, "Woe to the land of whirring wings [or locusts] along the rivers of Cush [that is, the region of southern Egypt and adjacent Sudan], which sends envoys by sea in papyrus boats over the water."

At one time, there was a large population of papyrus in northern Israel in an area that the Bible refers to as the waters of Merom (Joshua 11:5) or Lake Merom. This swamp, the Hula Swamp, was a malarial area. Zionists drained most of the swamp earlier in this century, destroying the habitat of the papyrus, the northernmost population of this plant in the world. Fortunately, there has been a concerted effort to restore part of the Hula Swamp and it is now possible to visit the area and see impressive stands of papyrus.

Paper as a writing material is mentioned in only one place in the Bible. (In Isaiah 19: 7, the Hebrew word arah is translated paper reed in the KJV, perhaps an illusion to papyrus. The NIV renders this as "plants along the Nile" which could also be papyrus.) This reference is in II John 12a-"I have much to write to you, but I do not want to use paper and ink." Chartes, the Greek word used here, is related to the English word chart. Greeks imported papyrus via the Phoenician town of Byblos, (modern Jbeil, about 25 miles north of Beirut, Lebanon) from which our word bible and related terms come. Thus, in New Testament times, paper was well known to writers such as the Apostle John.

There are a few additional wetland plants to consider in addition to giant cane, common reed, and papyrus. Like so many other references it is not possible to state with certainty the botanical names of these plants. Several candidates are likely, however, for the words translated from the Hebrew tse'el.

"Under the lotus plant (tse'el) he lies, hidden among the reeds (qaneh)", Job 40:21 and 40:22, "the lotuses conceal him in their shadow; the poplars by the stream surround him." The King James Version translates this verse as, "under the shady (tse'el) trees ('ets)". This description of the behemoth includes its reverie habitat. It is unfortunate that NIV translators used "lotus plant" in this verse. Lotus is the common name applied to water lilies, most often *Nelumbo lutea*. But it is also the Latin name of a genus of legumes, *Lotus*. Species of this genus are not aquatic plants. What is this mysterious plant linked with the likewise enigmatic behemoth?

Tse'el can mean, among other things, stalk or stick--in any case implying something slender. This could hardly be *Nelumbo* that has large round, usually floating leaves up to 1m across. A tall, slender, stick-like plant could be giant cane or common reed that would fit here except that qaneh is used later in the same verse. Papyrus could conceivably fit the description except that in Job 8: 11 the word achuw is translated papyrus.

Could this mysterious plant be one of the other aquatic plants frequent in the Middle East? In the context of Job 40, it should have the following features: form a stand dense enough to hide the behemoth ("...under the lotus plant he lies"); grow in a stream that might flood (.."when the river rages"); be part of a guild that includes poplars, possibly *Populus alba* (v. 22);

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and be a plant not incompatible with vegetation found along the Jordan River (v. 23).

Of plants found under such conditions, the most likely is *Typha domingensis* known in English as cattail. It forms dense stands and has long, narrow leaves that would be within the circumscription of the Hebrew word for something slender. The thick heavy rhizomes can withstand flooding and it is a common plant in the Jordan Valley.

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26 July 1998