THE REPORT OF THE JAPAN MISSION FOR THE
SURVEY OF THE UNDER-WATER ANTIQUITIES
AT QURNAH THE FIRST SEASON (1971–1972)

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Preface

In May 1855, a ship bearing more than two-hundred cases of Assyrian antiquities excavated at Khorsabad by V. Place and being sent on their way to France, was sunk in the lower reaches of the Tigris River near Qurnah, Iraq. In June 1971, the Japan Mission for Surveying the Underwater Antiquities at Qurnah was established. Its aim was to locate the lost relics, and it was founded under the auspices of the Society for Near Eastern Studies of Japan, the Chunichi Newspapers, and the Iraq government’s Directorate General of Antiquities. Excavation operations by the first expedition began on October 1, 1971, and continued until January 31, 1972. This paper is a progress report of that expedition.

I. History of the Excavation at Khorsabad

The chronicles of the excavations of the old Assyrian capital cities began in the first half of the nineteenth century. Europeans had long been interested in Mesopotamia (Fig. 1) as a Bible setting and decided to search for well-known Old Testament locations such as the “Tower of Babel” and the “Great City of Nineveh.”

The pioneering role in Assyrian archaeology was in many respects played by C. J. Rich. He surveyed the ruins at Nabi Junus and Kuyunjik, and sent his findings back to England. Next, P. E. Botta, the French Vice-Consul at Mosul, began excavating at Kuyunjik in 1842. He had no success in his first few months and subsequently moved to Khorsabad, located about twenty-two kilometers further northeast. He had heard from local villagers that stone sculptures had been uncovered. He began digging here in March 1843 and
almost immediately discovered the wall of a room covered with stone slabs filled with relief carvings. In the short span of two to three weeks he uncovered literally hundreds of meters of stone slab relief carvings as well as statues of a human-headed bull and a winged genie. We know now that Botta stumbled upon the grand palace King Sargon II constructed as his capital at Dur-Sharrukin, although Botta believed he had found the ruins of the Biblical city of Nineveh. He stated as much in his first dispatch to France dated April 5, 1843. Thereafter the excavations proceeded remarkably well, particularly with increased financial assistance from the French government and with the participation of the artist E. Flandin, who made scale drawings of the architectural and sculptural remains.\(^{(1)}\) Surmounting overwhelming transportation difficulties, Botta managed to ship most of his finds back to France.

From 1852 on, the new French consul at Mosul, Victor Place put a great deal of effort into the excavations at Khorsabad, where he continued Botta's work of unearthing King Sargon's palace. Place uncovered an additional 186
rooms, adding to a total of two hundred rooms. Thus was revealed a far more magnificent structure than the palaces seen at Nimrud and Kuyunjik. King Sargon’s palace built over a period of seven years (B.C. 713–707) is an imposing structure in the typical Assyrian palace style. It covers roughly ten hectares and is surrounded by a wall built upon a crushed stone base. Place managed to distinguish a total of two hundred rooms and thirty-one courtyards which he divided into three main sections: the Royal Palace (Sarai), Harem, and Attached Buildings. He further labeled the two independent structures on the west side as the “astronomical observatory” and the “sanctuary.” Today, Place’s “astronomical observatory” is recognized as a ziggurat, and the area he thought to be the Harem is now considered a sanctuary composed of six mortuary temples.

Earlier, Botta had unearthed statues of a human-headed bull, mythological figures, relief scenes of fighting and hunting, and other relief scenes of officials and tribute bearers in the Royal Palace. Place, too uncovered sculptures of human-headed bulls and winged genie in rooms numbered I–VIII. Although Place was not able to uncover any decorative sculpture from the attached buildings where business affairs and workshops, ovens and kitchens, stables and barns were located, he did manage to discover earthenware objects, implements of bronze and other metals, and colored glazed bricks. In the sanctuary, Place’s “Harem,” courtyard No. 27 was decorated with a band of figures done on glazed brick, the most famous perhaps being the puzzling procession led by a figure of a walking king followed by a lion, eagle, bull, fig tree, and plow (Figs. 2 & 3).

Place’s meticulous excavation of Sargon’s palace, together with the fine reproductions and plans drawn up by Felix Thomas, who joined the survey halfway through, were consolidated in a splendid three-volume report (two volumes of text, one of plates) by Place entitled Ninive et l’Assyrie, avec essais de
Today, when such a large part of these valuable relics rest buried somewhere in the lower reaches of the Tigris River, we are indeed fortunate to have the palace and its magnificent art forever preserved in such a fine three-volume document.

The intensification of the Crimean War (1854–1856) brought turmoil to the Middle East and forced Place to suspend his Khorsabad excavations. In 1928, the Oriental Institute of the University of Chicago recommenced the excavations and carried on the work of Botta and Place. The finds that the American group unearthed over a period of eight years were divided up with one part going to the Iraq Museum in Baghdad and the other going to the Oriental Institute of the University of Chicago.

II. The Qurnah Disaster

The Mesopotamian archaeological incident known widely as the "Qurnah Disaster" occurred in May 1855, near Qurnah, located at the confluence of the Tigris and Euphrates Rivers. A ship laden with archaeological findings traveling down the Tigris from Mosul to Basra, on the Persian Gulf, was attacked and sunk by Arab bandits near Qurnah. That attack resulted in a loss to Assyriology of more than two hundred cases of precious antiquities, including a large portion of Victor Place’s Khorsabad findings and other relics from Kuyunjik and Nimrud. In 1918, M. Pillet published a detailed report on the disaster, along with a fairly intricate reconstruction of events that was based on contemporary documents deposited in the Archives Nationales, Paris, i.e. reports, depositions, letters, and articles written by Clement and others.
who joined the search for the sunken relics. The following account is drawn from Pillet’s report, with particular emphasis on the problem of exactly where the Assyrian relics were sunk.

Aside from Place’s Khorsabad findings, other relics lost in the Tigris River included some forty-one cases of stone sculpture excavated from the palace remains of King Assur-bani-pal of Kuyunjik which Rawlinson, through Place, had presented to the Louvre, and relics excavated at Babylon and Bils-i-Nimrud by Fresnel and Oppert of France. The eighty-odd cases of relics from Nimrud and Kuyunjik included practically the whole collection of the French mission at the time, and also those findings going to the Prussian government in return for its contribution to the English Assyrian excavation mission.

A chronology of events may be reconstructed as follows. By the beginning of December 1853, Place had managed to transport his findings overland from the site at Khorsabad to the bank of the Tigris River. He originally planned to accompany the relics from Mosul down the Tigris to the port of Basra, where they would be transferred to the ship Manuel, sent by the French government to carry them back to France. Thus, on April 29, 1855, eight rafts (kelek) laden with relics left Mosul. Each kelek (Fig. 4) was built with a wooden framework to which inflated sheep skins were attached. The rafts had shallow drafts which enabled them to ride the swift river currents with ease and to avoid running adrift on shoals along the way. The inflated sheep skins, made by cutting off the heads and removing the bones and meat but leaving the outer skins intact, would last about one month. If more time was required for transfer the air would have to be replaced or the skins changed.

When the rafts reached Baghdad on May 4, Place found orders waiting for him there to proceed at once to a new post. Hence he turned over his precious relics to Clement, a French citizen who was teaching European languages at Pasha. Also at Baghdad, Fresnel and others added their findings and the convoy
left here with four rafts and one ship. The two human-headed bull images and the two winged genie images from Khorsabad, along with a few smaller items, were each loaded onto separate rafts. The ship was loaded with Place’s relics from Khorsabad and Kuyunjik, forty-one cases of relics from Babylon, Bils-i-Nimrud, and other places collected by the Fresnel party, the findings unearthed by the English group from Nimrud and Kuyunjik which Rawlinson had turned over to France, and an additional eighty cases headed for the Berlin Museum.

Rawlinson and Fresnel were already anxious about the convoy’s safety because of increasing Arab rebellions along the Tigris River in Southern Mesopotamia. On top of that, the fifty-ton ship (Fig. 5) originally contracted for seems to have been changed at the last minute, since the captain and crew carried aboard an additional large amount of commodity goods. These commercial goods were what in fact provoked the Arab attacks. Moreover, the ship made one unscheduled stop just out of Baghdad for loading another five crates of goods weighing two hundred and fifty kilograms. Rawlinson and Fresnel’s well-founded fears were soon to be proved.

Fig. 5 Typical boat used for Tigris River transport at time of Qurnah Disaster

The ship left Baghdad on May 13. The plundering began on May 18 with the appearance of Abu Shulk, a sheikh of the Beniram tribe. On May 20, the ship was attacked by Ali, a nephew of Sheikh Faisal of the Mousabet tribe. The attackers stole the transport party’s money and gifts for the sheikhs through whose territory they would have to pass on their way down the river, and made off with any other easy-to-carry items. The next day the group was ordered to stop for customs at Zechiya (9) and were levied a toll tax. Since their money was gone, two of the ship’s passengers had to travel downstream to Qurnah to obtain funds to pay the toll. Of the two, a traveller from Baghdad, brought the money back immediately. The other, a sailor born in Qurnah, did not
return until two hours after sunrise. He seems to have gone to report on the ship's progress to Sheikh Abu Saad while in Qurnah.

A little further on at Azer, the ship was boarded again, this time by another nephew of Sheikh Faisal. Azer is the site of a Jewish temple and is located about twelve kilometers south of Zecheiya. Little was stolen at the time of this boarding. But they were attacked again and again, until finally Abu Saad’s ship appeared. The armed crew rammed into the cargo ship and swarmed aboard in numbers large enough to nearly sink it. The sailor mentioned above as
being in league with the bandits took the tiller and headed the ship toward the bank. There he unwittingly sank it. She went down at right angles to the left bank, sharply inclined toward the left gunwhale with the stern sunk completely underwater and the bow just barely above the surface. The site (Fig. 6) was three miles north of Qurnah.\(^{10}\) Clement and Michel stated that they thought the attack took place at Burbukht\(^{11}\) (Fig. 7), two hours out of customs. The ships passengers barely managed to gather their personal effects together and jump to safety on the rafts.

Now to backtrack a bit, when the ship put in for customs at Zecheiya three rafts anchored slightly downstream and waited. The fourth raft continued downstream to Qurnah. Later, at Qurnah, immediately after the four rafts had regrouped, Abu Saād appeared and the plundering began again. Up to this point, although the commercial goods had been looted, the archaeological findings were pretty much ignored for they had no monetary value to the Arabs. But unfortunately, the rafts did contain something the Arabs wanted which was wood. Lumber is not produced in southern Mesopotamia, and the attackers wanted the rafts' wood. Raft number one, loaded with a winged genie was run aground, the wood removed, and the small boxes of stone sculpture stolen. The location was reportedly one and a half hours downstream from Qurnah. The winged genie image was left on the shore. There it was completely covered at high tide but reappeared at low. Over the years the current and tides wore the stone away until it lost all appeal as a work of art and became impossible to salvage. A few small boxes were rescued, however, and eventually were safely deposited in the Louvre.

Raft number two, loaded with a human-headed bull image, had its lumber extracted but managed to keep floating downstream until the following morning when it finally sank in deep water and its cargo lost forever. The exact
site cannot be verified but an eye witness account located it in mid-stream about sixteen kilometers upstream from Máaqil. Máaqil is located about eighty kilometers upstream from Basra.

Raft number three, carrying the other human-headed bull image (weight 32 tons, Louvre, Assyrian Room No. 14) ran aground at Máaqil on the right bank next to the English Consul building. Raft number four, loaded with the second winged genie image (weight 14 tons, Louvre, Assyrian Room No. 18) and fifteen crates of relics (each crate 60 × 90 × 39 centimeters), safely arrived at Máaqil.

Salvage operations for the lost relics began at once and continued until the end of February 1856. Further attempts were periodically made up until March 1857. During these operations several small boxes from raft number one and fifteen cases from raft number four were retrieved. The winged genie and human-headed bull images which safely reached Máaqil were left in the mud by the river and became somewhat worn by the tides. In September 1855, both images finally were moved to safety.

The Governor-general of Basra, Mohammad Veice Pasha, is said to have had seven of the largest crates from raft number two salvaged along with some relics from the other rafts and from the ship. Lieutenant Colonel Meswud Bey, a Belgian attached to the Turkish army at the time, aided in the rescue operations and with the loading of the Manuel. On June 9, 1855, he set out by boat to retrieve relics stolen by the Arabs; he returned on the eleventh with two stone sculpture fragments which he managed to obtain for a large sum of cash. He went out one more time as well and altogether was able to recover six boxes of lost or stolen relics.

On June 15, Clement returned to Qurnah with a diver to try to salvage the sunken relics, but when he discovered the ship was under two fathoms of water he judged the situation hopeless and returned empty-handed to Máaqil on June 19. Meanwhile, other salvage attempts at Qurnah yielded one box of relics and four rather worn cuneiform tablets, which all seem to have been from one other box. Clement went to Qurnah again on September 21, 1855, this time with two boats and an Arab diver. They located the ship lying at right angles headed toward the bank, with the left gunwhale severely tilted toward the stern. The ship's bow stuck about twenty-five centimeters above the water but the stern was thrust one meter into the mud bottom under three fathoms of water. Thus, Clement had to give up once again any attempt to recover the...
sunken treasures.

Commander du Masoneuve of the French warship Sybeil, arrived in Basra during February 1857 with orders to salvage the lost relics. On the twenty-fourth, he borrowed a Turkish steamship and set out from Basra, reaching Qurnah on the morning of the twenty-seventh. He proceeded directly to the site of the sunken ship. One of the sheikhs of Qurnah brought him the following report:

The wind from north caused the river to swell so much that only two meters from shore the water depth is one fathom; the stern of the sunken ship lies in deep water four meters from the bank. Some other relics lost by the French Mission were sunk off the left bank of the Tigris directly in front of the minaret of Qurnah, located about one mile opposite the left bank of the Euphrates River.

Just how reliable this information was must be doubted, for the area around Qurnah at this time was in turmoil and the Europeans viewed the local sheikhs and villages about as trustworthy as thieves. Even though the Commander and his party were not attacked, the usual toll fees were extracted. But all went for naught, for despite the powerful equipment installed aboard the steamship, the water's depth and coldness made any salvage attempt impossible. On his return to Basra, Commander du Masoneuve strongly emphasized that to salvage the lost ship operations must be conducted in summer using steamship equipped with a strong hoist and heavy anchors for stability. Moreover, a strong wrench should be set on the bank, and a large flat-bottomed barge must also be employed.

The relics that made it safely downstream, those salvaged from the water, and those recovered from the Arab thieves were all finally loaded at Mááqil on November 25, 1855, nearly six months after the Manuel first arrived to transport the relics to France. The bills of lading exchanged between the captain of the Manuel, Clement, and Taylor, the English Vice-Consul at Basra, indicate that the following crates were loaded.

<table>
<thead>
<tr>
<th>B/L Date</th>
<th>Number of Items</th>
<th>Destination</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 20, 1855</td>
<td>20 cases</td>
<td>Louvre</td>
</tr>
<tr>
<td>June 23, 1855</td>
<td>4 cases</td>
<td>Louvre</td>
</tr>
<tr>
<td>July 4, 1855</td>
<td>2 cases</td>
<td>Place (personal items)</td>
</tr>
<tr>
<td>October 30, 1855</td>
<td>52 cases</td>
<td>British Museum</td>
</tr>
<tr>
<td>November 12, 1855</td>
<td>1 case</td>
<td>Louvre, Assyrian Room, No. 14 (Winged Genie Image)</td>
</tr>
</tbody>
</table>

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Of the total of eighty cases, fifty-two cases marked for the British Museum were relics transported over a different route from that chosen by the French who met disaster at Qurnah. In return for France's shipping these relics back to Europe for them, England donated reliefs from Kuyunjik and Nimrud to the Louvre. Thus, of a total of twenty-four cases bound for the Louvre, sixteen were gifts presented to France by the English.

The Manuel left Maáqil on December 9, 1855, made a brief stop in Bombay, and finally arrived safely at Le Havre, France, on May 20, 1856.

Place did not make a detailed catalogue of his relics at Baghdad before shipping them downstream. He simply informed Clement that he had sent two hundred and thirty-five cases, including the crates with the huge statues and those that contained books, excavating tools, and other personal belongings. Thus unfortunately, no accurate record of the relics lost in the Tigris and Shat el Arab Rivers exists. We do know that twenty-eight cases, including the two huge statues, were rescued, which means that 207 cases were lost. We surmise the following break-down of cases lost.

- Human-headed Bull Image: 1 case
- Winged Genie Image: 1 case
- Mission Finds: 41 cases
- Berlin Museum Relics: 80 cases

Total 123 cases

These 123 cases plus the twenty-eight recovered, however, gives a total of only 151 cases, which leaves eighty-four cases unaccounted for. In those were Place's excavation finds and his personal belongings.

III. Implementing the Salvage Plan

From the fall of 1956 to the spring of 1957, approximately one hundred years after the Qurnah Disaster, the First Tokyo University Iraq-Iran Archaeological Expedition excavated the relic mound Telul-eth-Thalathat in a primitive farming village near Mosul. After the ground-breaking ceremony,
attended by Prince Mikasa of Japan, the entire Tokyo University group was
invited to the Baghdad home of the late Doctor Nazi-al-Asil, Iraq’s Director
General of Antiquities at the time. During the course of a pleasant discussion
about ancient Mesopotamian civilization, Doctor Nazi touched briefly on the
topic of Iraq’s underwater antiquities and indicated that he would like to see
Japan, with her advanced underwater salvage technology, take up the search.
In 1962, Doctor Nazi mentioned the subject again in more specific terms with
Namio Egami when the latter attended the 1500th Anniversary celebration
of Baghdad founding. The Professor sounded out the Japanese side, stating in
effect that if a Japanese group would work to salvage Qurnah’s underwater
cultural properties, Iraq would contribute generously toward covering the ex-
penses. He explained that the lost relics were an important part of the Assyrian
archaeological past. Of course, an enormous quantity of relics had been unear-
thed at Nimrud, Kuyunjik, and Khorsabad, the locations of the great capital
cities during the height of the Assyrian empire, but the great majority were taken
to France and England. If a Japanese mission undertook the search and met
with any degree of success, then not only Iraq but also Japan would benefit.

Incidentally, shortly before this, France had expressed interest in searching
for the lost Qurnah relics and had applied for permission to the Iraq government.
In 1956, however, the Suez War erupted and Iraq, as an Arab nation, broke off
relations with both England and France. French planning for salvage operations
at Qurnah was halted. This situation throws some light on Doctor Nazi’s
proposal that Japan conduct a search.

When Doctor Nazi first mentioned Qurnah and a possible Japanese expedi-
tion, the Japanese were in no position to accept. When Doctor Isa Salman,
Iraq’s new Director General of Antiquities, visited Japan for Expo ‘70, however,
he met with the Society for Near Eastern Studies in Japan, and the Chunichi
Newspapers in another energetic discussion about the joint sponsorship of a Japa-
nese mission to salvage the precious relics lost in the rivers near Qurnah. These
talks bore fruit.

On June 1, 1971, the Japan Mission for the Survey of the Underwater
Antiquities at Qurnah (under the direction of Namio Egami) was established
by the official agreement of the governments of Iraq and Japan, under the auspices
of the Society for Near Eastern Studies, Japan, the Directorate General of Anti-
quities, Iraq Government, and the Chunichi Newspapers, with the added assis-
tance of the Japanese Ministry of Foreign Affairs, Office of Cultural Affairs, and
the Iraq Embassy in Tokyo. Preparations began immediately with a target date of October 1, 1971, for commencing actual survey operations. The survey team had two sub-groups: the first consisted of members working with the survey, disembarkation, general affairs, and information; the second consisted of members specializing in art and archaeology, history and language, repair and preservation, and documentation. People from two private companies, moreover, whose practical experience and know-how were necessary for the actual search and salvage operations, also joined the expedition. The companies were Kokusai Kogyo Company, with much experience in operating ocean and river sounding equipment, and Fukada Salvage Company, well known in the field of underwater detection and recovery operations. Fukada Salvage’s most notable success was recovery of the battleship Mutsu. Scholars included specialists in underwater archaeology, rivers and river channel shifts, repair and preservation of cultural properties, cuneiform writing, and other fields. Altogether, the survey team consisted of thirty-four members. To this group two representatives were dispatched from Iraq’s Directorate General of Antiquities to help in any way necessary.

The first members set out for Qurnah on September 21, 1971. The four-month survey opened as planned on October 1.

IV. Site Surveys

In our first investigation we concentrated mainly on surveying the river bottom, with only a supplementary examination of the surrounding land. The first region to be surveyed included the area from the confluence of the Tigris and Euphrates Rivers (Fig. 8 and 9) to a point seven kilometers upstream at Naif Beg where the river channel bends widely. An additional few spot surveys were made further downstream. As mentioned earlier, Abu Saad’s attacking ship, whose crew we later learned was from the village of Al Naharat, first appea-
red in the vicinity of Al Burbukh (Fig. 10), readily marked by the relic mound Tell Burbukh. Records indicate that the relic-laden ship sank close to the left bank in an area four to six kilometers north of Qurnah, somewhere opposite the stretch of land running between the villages of Shaiyah and Al Eajami. This corresponds to the region from T18 to T12 in Figure 10.

The river bottom survey was carried out using an echo sounder device called a “sonostrater.” It operates by utilizing pulses of sound to locate sixteen primary and eight secondary locations in those sedimentation layers forming the river bed where it is judged there are “foreign objects.” This operation was under the direction of Kokusai Kogyo. Excavation operations were then conducted at designated spots using divers and a dredge. This was under the direction of Fukada Salvage.

In a comprehensive survey of the river banks adjacent to the general site of our underwater survey our group attempted to locate more precisely the river channel as it was at the time of the Qurnah Disaster. To this end, geographical and geological data were correlated with the information obtained from archaeological artifacts found scattered throughout the area, and checked with interview statements made by old villagers. Moreover, much time was spent ferreting out old maps and reviewing nineteenth century exploration reports at archives in Baghdad, Basra, Paris, and London.

The following represents the overall results of our river bottom survey and our investigation of the surrounding river banks.

1. **River bottom survey**

   Our first need was for a reliable map of the river where we planned to
Fig. 10 Map of region surveyed at Qurnah
survey. We established standard points (T₀⁻T₂₆ in Fig. 10) by transverse measurement and then used these to establish seven hundred guide points at intervals of ten meters. This operation took twenty-six days, much longer than we had anticipated. Some of the bamboo pickets marking the guide points were removed by villagers, and others were sometimes covered by the tides.

We then began our sonostrater survey (Fig. 11). Here, too, we experienced difficulties. Operations that we had expected to take two weeks ended up taking nearly forty days due to equipment breakdowns. This in turn delayed our diving operations until after the beginning of November. Still another delaying factor was the extremes between heat and cold. During the first half of our survey we were plagued by temperatures rising above fifty degrees centigrade. On the other hand, during diving operations, water temperatures sometimes dropped below ten degrees centigrade, and severely hampered our divers. Still another reason for delay rests with the local custom where work ends for the day at two o’clock in the afternoon.

The first survey was primarily a river bottom investigation carried out using a sonostrater. Access to this modern device allowed our team to survey an underwater area extending seven kilometers in length, a quite substantial accomplishment. But we never did manage to master operation of the sonostrater completely since it was a new equipment for all of us. We will discuss this device to give a clearer understanding of our survey and to suggest the future possibilities of using such modern equipment in general underwater archaeological investigations.

Sound wave detection devices were developed and advanced primarily in the United States. The sonostrater we used was an improved version of the echo sounder type of device used for measuring water depths. Several types of these devices are available, classified chiefly by how the sound is produced and by the wave or pulse frequency. The sonostrater, like the sonoprobe that was also developed in the
United States, utilizes a “gravitational warp oscillator” that operates at a high frequency of 3000 Hz. The sonostrater, slightly improved over the sonoprobe, is able to distinguish objects as small as fifty centimeters in breadth. It is used primarily in shallow water, applicable in situations up to thirty meters deep. But in very shallow water, its analytical ability falls off sharply. (See Figure 12)

Operation is as follows. The transmitter, called a “projector,” sends out a strong sound pulse. The receiver, called a “hydrophone,” picks up the pulse after it has been reflected from the river bottom and the sedimentary layers beneath. Meanwhile, the boat carrying the sonostrater moves slowly across the river from right bank to left recording continuous time sections that correspond to changes in the boat’s measuring position. Those time sections, of course, are not depth sections. Since they record the span required for the pulse from the projector to be reflected from the bottom and picked up by the hydrophone, adjustments must be made to obtain depths. This is done by determining the longitudinal wave velocity using one of several possible methods. These include the “earthquake survey refractive method,” “the boring velocity method,” or by on-site excavation confirmation, and then converting to find depths.

For our survey, the projector and hydrophone were placed one on either side
of the boat and each set seventy centimeters below the surface of the water. The projected sound pulse had a total energy of thirty-six joules, half of which was concentrated within an angle of one-hundred and twenty degrees. Thus, we say that the directional ability, or directivity, equals a one-half reduction angle of one-hundred and twenty degrees. The remaining eighteen joules are scattered beyond this angle. If we work in water that is five meters deep, the one-half reduction angle is one-hundred and twenty degrees and the sound pulses would cover a range of river bottom, eighteen meters wide. Even outside the directional angle, however, half the energy is reflected so that the reflected pulses actually picked up by the hydrophone cover ten meters on either side of the boat, for a total of twenty meters. Our sonotrater survey team took time sections in ten-meter intervals moving at right angles to the river channel. When the water was five meters deep, therefore, we could cover the whole twenty-meter range at one time. Even when the water was slightly less than five-meters deep, the area left uncovered can be considered to have been minimal. For further precision, of course, we could have taken time sections every five meters, but we did not consider them to be absolutely necessary, and we did not have the time.

Figure 13 shows time sections taken at locations 570 meters and 580 meters upstream from the confluence point. The time sections reveal a bell-shaped echo (trace) under the river bottom. These are not separate occurrences, but are traces of the same object. The same trace appears in the time section taken at the 560-meter mark as well. This trace represents the presence of some object, for mere noise interference would not appear three times in succession. Moreover, since all these traces reveal the same shape, the number of echo analyses that must be done is greatly reduced.
After completing soundings at right angles to the river channel, the survey
team next laid four measuring lines parallel to the river channel and took another
series of time sections. After completing this step, each of our three analysts
made his own separate study of the data to ensure that nothing was overlooked.
If a large number of stone objects in the hold of a ship were protruding above
the river bottom the sound pulses reflected would show a dark black trace on the
time section while the area directly below would be left untouched and, hence,
would remain white-colored on the time section. Such a pattern would be
immediately recognized even without close analysis. Regrettably, we were
not fortunate enough to see that pattern. In other words, the sunken ship is not
protruding from the river bottom. If assumed to be in the present river channel,
it must be buried in the sedimentary layers forming the river bed.

The traces selected by our three analysts, each working independently,
exceeded a total of 130 locations. After conferring, however, the analysts
reduced those 130 to sixteen locations most likely to contain the kinds of objects
we were searching for. These sixteen spots were supplemented by a second
group of eight others. The entire twenty-four locations were rechecked by
taking additional soundings to confirm the traces. We then set buoys to mark
the spots, and made one final sounding to be absolutely certain of our data.

Diving operations by Fukada Salvage were the next step in our work. Divers
probed the twenty-four spots selected by the trace analysts plus four more locations
added after completing interviews with people in nearby villages. We then
drew concentric circles and radiating lines centered on the points marked by the
buoys. Divers probed the intersections of the lines and circles with iron bars
to try to confirm the presence of objects. This probing technique requires a
great deal of experience on a diver's part. A diver must distinguish among
materials merely by the resistance he feels on the probing bar. We dispatched
one diver to Baghdad for study on the resistances of materials like earthenware
and alabaster (Mosul marble). When the river bottom was too hard for the
diver to probe by hand, a barge mounted with a fifteen ton crane was employed
to dredge the area. The diver tried again after the dredging was completed.

Figure 14 records the results of these iron bar probes. The right-hand
column records the water's depth. No depths were less than three and one-half
meters. Moreover, at those sites that were 3.5 meters deep, i.e. No. 14 (cor-
responding to B14 in Figure 13; located in Course 467, which is 4,760 meters
from the confluence) and No. 23, the divers found nothing at all. In short,
### Fig. 14 Iron bar probe results

<table>
<thead>
<tr>
<th>BU- OY</th>
<th>COURSE</th>
<th>DATE</th>
<th>RESULTS</th>
<th>DEPTH UNDER RIVER BED</th>
<th>RANGE OF POSSIBLE OBJECT</th>
<th>JUDGMENT</th>
<th>WATER DEPTH (m.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>upstream</td>
<td>12-14-71</td>
<td>POS. 0.4m</td>
<td>1.7~2.1m</td>
<td>10m radius</td>
<td>hard mud and some rock</td>
<td>4.5m</td>
</tr>
<tr>
<td></td>
<td>5m 22</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>46</td>
<td>12-14-71</td>
<td>POS. 0.6m</td>
<td>2.0~2.5m</td>
<td>3.5 x 3.0m</td>
<td>several hard layers in rock</td>
<td>5.0m</td>
</tr>
<tr>
<td>3</td>
<td>58</td>
<td>12-13-71</td>
<td>POS. 0.5m</td>
<td>2.3~2.5m</td>
<td>5.0 x 1.0m</td>
<td>wide spread rock</td>
<td>5.0m</td>
</tr>
<tr>
<td>4</td>
<td>68</td>
<td>12-8-71</td>
<td>NEG. 0.6m</td>
<td>2.5m</td>
<td></td>
<td></td>
<td>5.5m</td>
</tr>
<tr>
<td>5</td>
<td>79</td>
<td>12-30-71</td>
<td>NEG. 0.5m</td>
<td>2.5m</td>
<td></td>
<td></td>
<td>6.5m</td>
</tr>
<tr>
<td>6</td>
<td>116</td>
<td>12-11-71</td>
<td>POS. 0.5m</td>
<td>1.8m</td>
<td>1.6 x 1.2m</td>
<td>rock</td>
<td>5.5m</td>
</tr>
<tr>
<td>7</td>
<td>117</td>
<td>12-12-71</td>
<td>POS. 1.0m</td>
<td>2.2m</td>
<td>6.5 x 7.0m</td>
<td>hard layer wood fragment's</td>
<td>4.0m</td>
</tr>
<tr>
<td>8</td>
<td>253</td>
<td>12-20-71</td>
<td>NEG. 1.5m</td>
<td>2.5m</td>
<td></td>
<td></td>
<td>4.5m</td>
</tr>
<tr>
<td>9</td>
<td>272</td>
<td>12-23-71</td>
<td>NEG. 2.3m</td>
<td>3.5m</td>
<td></td>
<td></td>
<td>6.5m</td>
</tr>
<tr>
<td>10</td>
<td>326</td>
<td>12-15-71</td>
<td>NEG. 3.0m</td>
<td>4m under river bed</td>
<td>2.5m</td>
<td></td>
<td>4.0m</td>
</tr>
<tr>
<td>11</td>
<td>345</td>
<td>12-29-71</td>
<td>NEG. 3.0m</td>
<td>3.0m</td>
<td></td>
<td></td>
<td>4.5m</td>
</tr>
<tr>
<td>12</td>
<td>375</td>
<td>1-3-72</td>
<td>POS. 3.2m</td>
<td>0.5~2.0m</td>
<td>10m radius</td>
<td>skell layer at 0.5m, sand layer at 2.0m</td>
<td>5.0m</td>
</tr>
<tr>
<td>13</td>
<td>391</td>
<td>12-18-71</td>
<td>NEG. 0.3m</td>
<td>2.5m</td>
<td></td>
<td></td>
<td>4.5m</td>
</tr>
<tr>
<td>14</td>
<td>476</td>
<td>12-22-71</td>
<td>NEG. 0.8m</td>
<td>2.5m</td>
<td></td>
<td></td>
<td>3.5m</td>
</tr>
<tr>
<td>15</td>
<td>515</td>
<td>12-25-71</td>
<td>NEG. 1.5m</td>
<td>2.5m</td>
<td></td>
<td></td>
<td>4.0m</td>
</tr>
<tr>
<td>16</td>
<td>639</td>
<td>12-20-71</td>
<td>POS. 0.3m</td>
<td>1.8~2.3m</td>
<td>2.0 x 3.0m</td>
<td>rock core in hard mud</td>
<td>10.0m</td>
</tr>
<tr>
<td>17</td>
<td>8</td>
<td>1-25-72</td>
<td>NEG. 0.3m</td>
<td>2.5m</td>
<td></td>
<td></td>
<td>6.0m</td>
</tr>
<tr>
<td>18</td>
<td>17</td>
<td>1-10-72</td>
<td>NEG. 1.2m</td>
<td>Not possible</td>
<td></td>
<td></td>
<td>6.0m</td>
</tr>
<tr>
<td>19</td>
<td>54</td>
<td>1-11-72</td>
<td>NEG. 0.8m</td>
<td>2.5m</td>
<td></td>
<td></td>
<td>4.5m</td>
</tr>
<tr>
<td>20</td>
<td>260</td>
<td>1-7-72</td>
<td>NEG. 0.5m</td>
<td>2.5m</td>
<td></td>
<td></td>
<td>5.5m</td>
</tr>
<tr>
<td>21</td>
<td>269</td>
<td>1-4-72</td>
<td>NEG. 1.0m</td>
<td>2.5m</td>
<td></td>
<td></td>
<td>6.5m</td>
</tr>
<tr>
<td>22</td>
<td>342</td>
<td>1-4-72</td>
<td>NEG. 2.0m</td>
<td>3.0m</td>
<td></td>
<td></td>
<td>4.5m</td>
</tr>
<tr>
<td>23</td>
<td>422</td>
<td>1-9-72</td>
<td>NEG. 2.2m</td>
<td>2.0m</td>
<td></td>
<td></td>
<td>3.5m</td>
</tr>
<tr>
<td>24</td>
<td>567</td>
<td>1-25-72</td>
<td>NEG. ?</td>
<td>4m under river bed</td>
<td>2.5m</td>
<td></td>
<td>?</td>
</tr>
<tr>
<td>25</td>
<td>in front of mosque</td>
<td>1-18-72</td>
<td>NEG. ?</td>
<td>Surface survey</td>
<td></td>
<td></td>
<td>?</td>
</tr>
<tr>
<td>26</td>
<td>Adam tree</td>
<td>1-19-72</td>
<td>NEG. ?</td>
<td>1.0m</td>
<td></td>
<td></td>
<td>?</td>
</tr>
<tr>
<td>27</td>
<td>in front of mosque</td>
<td>1-20-72</td>
<td>NEG. ?</td>
<td>1.0m</td>
<td></td>
<td></td>
<td>?</td>
</tr>
</tbody>
</table>

**NOTES:** RESULTS indicate positive/negative iron bar probe confirmation of possible objects located by sonotrat. BOUY No. 9, 10, and 11 tests were conducted at Hermet (iron bar 3.5 meters).
the sites of any real significance were all at least four meters deep.

Before continuing my discussion of the diving probes, let me briefly clarify the sonostrater survey a bit further. In the upper portion of Figure 16 there are two parallel lines. The upper line indicates the positions of the projector and hydrophone, each set seventy centimeters below the water’s surface. This line thus is under water. The lower line represents the arrival time of pulses traveling from the projector to the hydrophone without being reflected off the river’s bottom. Since the hydrophone and the projector are set two meters apart, the distance between the two parallel lines corresponds to a water depth of two meters. Traces from this lower line are so strongly represented that traces from the nearby river bottom and underlying layers are apt to be obfuscated. Thus, when the water’s depth is less than the distance between the projector and the hydrophone, i.e., less than two meters, the device’s analytic ability falls off. Also, although not shown in Figure 12, soundings made near shore are also confusing. This is because extraneous pulse reflections are picked up from the river bank.

Considering the above shortcomings of the sonostrater in shallow water and when used close to river banks even in deep water, our analysts limited their selection for further probing to sites in deep water away from the river banks.

One more problem arose while surveying the shallow sections of the river. As the water’s depth decreased, the breadth covered by the sound pulses became narrower. At intervals of ten meters, for example, a missed band arose squarely between our two sounding lines. In water two meters in depth, the projector and the hydrophone were set seventy centimeters beneath the surface and thus were only 1.3 meters from the river’s bottom. Since the pulses radiate at a one-half reduction angle of 120°, their range would be from 2.5 to 3 meters on either side of the sounding line. If the sounding lines were set in intervals of ten meters, an uncovered strip about four meters wide would result. When the water’s depth falls below two meters, the uncovered area increases still further. To make matters worse, the present Tigris River channel has fairly wide sections of shoals less than two meters deep. The approximate spot where the ship presumably sank is today a shoal on the left bank, about five kilometers north of Qurnah. Even a small boat cannot reach shore there. But travel accounts suggest that the river was much wider in the mid-1850s.(14) This is a perfectly reasonable assumption, for a dam has been constructed upstream for water resources control. We eventually must investigate these shallows, but it is not
possible to do so with the sonostrater. This does not mean, however, that the sonostrater was not useful at the stage of our operations. We know that in the span of 117 years it is perfectly natural that the river channel could have shifted, and ample evidence suggests that the part of the left bank mentioned in chronicles is now located near the center of the present channel. Moreover, we must consider the possibility that the sunken ship might have shifted position on the river bottom, or might even have broken up and the relics scattered about.

Let me return now to discussing our diving and probing operations. When the operations first began, we had two surprises. First, contrary to our presumption during the sonostrater survey that the river bottom would be comprised of pretty much the same quality of mud, we frequently found layers of sand and of sea shell at our probe points. Also, we found two kinds of mud within 1–3 meters of the bottom, soft and fairly soft. This mud contained, aside from the layers of sand and sea shells mentioned above, earthenware fragments (Early Islamic Period), date palm wood, iron fragments, pieces of projectiles, and other objects. Deeper than three meters, we found a hard mud layer which was extremely difficult, if not impossible, for our divers to probe by hand.

Second, objects which the sonostrater located within one meter into the river bottom were usually found two meters deep or deeper. Likewise, those objects that the sonostrater indicated were three meters or more deep were more likely to be found even further down, making it almost impossible to probe for them with an iron bar. Moreover, since we did not find any “objects” in the hard mud layer (which was seven meters or more from the water surface, with the water depth at four meters) there was practically no necessity to probe that deeply, as I will explain.

In sum, we were unable to discover the sunken vessel, which leads to the following conclusions: 1: We investigated areas in water over 3.5 meters deep and within zero to three meters under the river bed where we confirmed the presence of a few small objects. That we were able to locate such small objects suggests that if a sunken ship more than ten meters long had been there we certainly would have found it. We conclude that the ship is not in the area we surveyed and believe that no further surveying of this area is necessary. 2: New surveys should be undertaken in the shallow sections of the river under three and a half meters deep. Particular attention should be paid to areas less than two meters in depth, for the sonostrater has only partially checked them. For any resurvey of shallow areas to be truly meaningful, however, the sonostrater's analytic capa-
bilities must be improved. Otherwise, even if the sunken ship did exist in these shoals, noise and other interference would make identification nearly impossible.

2. River Bank Survey

A. Location of old river channels

Nearly one-hundred and seventeen years have passed since the Qurnah Disaster of May 1855. Research into geographical and local records suggests that the river channel could not possibly have remained stationary in that span of time, particularly in view of the region's flatness. If we assume for this discussion that the length of the ship sunk near Qurnah was thirty meters, we can see immediately that even in its seasonal change the river could move well past the ship. Thirty meters is a very short distance in terms of seasonal difference between high and low water levels. In many locations the shift is much greater. Therefore, in a hundred year span, there can be no doubt that even larger shifts occurred.

Research methods, however, are not yet sophisticated enough to help pinpoint the location of any particular part of the river channel that existed one hundred years ago. Only at locations where ideal conditions allow us to assemble enough archaeological, historical, and geographical data upon which to base a thorough survey can we make even a fair estimate of the location of a particular part of the old river channel. But to conduct such a comprehensive survey, specialists from many fields would have to undertake a correlated investigation that is likely to require much more time and energy than the results would apt to be worth. In that sense, our river bank survey was a preliminary investigation, with the main one to follow during the next expedition.

The Tigris River dissects the desert and forms plains in the narrow valley basins to the vicinity of Samarra, about 150 kilometers north of Baghdad. Up to this point, the Tigris drops at a pretty fair gradient of fifty centimeters per kilometer. Once past Samarra, however, the gradient suddenly flattens out to only seven centimeters per kilometer. At Mahjub, located midway between Samarra and Baghdad, the river enters a broad plain. This flood plain lies in the wide area north of an imaginary line connecting Kut on the Tigris River (350 kilometers downstream from Baghdad) and Hilla on the Euphrates. Natural levees have been formed here on both banks, two or three meters higher than the marshlands behind. Several crescent-shaped cut-off lakes indicate that an earlier river channel meandered through the region. Water in the irrigation
channels here runs down from the Euphrates to the Tigris because of the former's higher bed.

Below Kut there was apparently an old delta plain. If we draw a line through the old plain connecting Amara (590 kilometers south of Baghdad, 140 kilometers north from Qurnah) and Nasiriya on the Euphrates River, we find conditions north and south of the line somewhat different. On the northern side, the Tigris drops at a gradient of three centimeters per kilometer, the natural levees are low, and a marsh covers much of the area. Here the height of the Tigris River bed is higher than that of the Euphrates, and at Kut the Tigris branches into three tributaries which flow downstream toward the Euphrates. The furthest west of these is the Gharraf River. It flows near Lagash and empties into the Euphrates at Nasiriya. Many relics are scattered along its banks. This general area is fast becoming a desert, for sand and silt are not being dredged from the river and the surrounding land is not being irrigated.

The middle tributary, the Dujail River, which passes near Wasit, was apparently the mainstream of the Tigris around 1300. Flowing furthest east is today's channel, which became the mainstream beginning in the sixteenth century. All this serves to show that the channel of the Tigris has shifted a great deal over the centuries. Naturally, the channel we see today is by no means stabilized. For example, during high waters in the spring of 1954, the river left its present channel upstream from Kut and ran along the western side of the Gharraf River, emptying into the Euphrates near Nasiriya. The present river's instability is recognized in terms of flow as well as channel shift. In 1955, De Vaumas showed that at Kut the Tigris had a flow rate of 6,200 m³/second, but that at Amara the rate was 560 m³/second. Normally the flow downstream at Amara is greater than at Kut, but the 1955 observations show just the opposite. What that means is that between Kut and Amara, 90 per cent of the flow volume left the channel and entered a broad marsh. Most of the great load of silt and sand carried down the Tigris accumulates in marshes. One can readily imagine marshland stretching to the river's mouth. In fact, the quantity of silt and sand reaching the river mouth is so great that dredging at the port of Fao must go on ceaselessly. If even a day of dredging were to be neglected, the port would clog and ships would be unable to enter.

In the southern half of the old delta plain downstream from Amara, the Tigris River has practically no gradient and the area is covered with marsh and lakes. Since most of this region is less than four meters above sea level, during
the high water season in May and June much of it turns into lakes. During the dry season, on the other hand, it becomes desert land. The lowest lying areas are covered with water throughout the year, with depths generally ranging from one to two meters.

As mentioned earlier, Qurnah lies at the confluence of the Tigris and Euphrates, located 730 kilometers downstream form Baghdad and 170 kilometers from the Persian Gulf. In the Qurnah area natural levees have developed which are slightly higher than the nearby marshland. The water level daily rises and falls about ninety centimeters due to the tides. This action reduces the salinity of the land, making it extremely fertile. A date palm orchard adjoins the marshland, appearing like a long narrow island floating upon a giant sea of marsh. Surveys indicate that the area around Qurnah lies 2.6 meters above sea level; the river at its high water point is 3.1 meters, and the channel's deepest point is 9.8 meters below sea level. Thus the whole region is extremely low lying. Moreover, in this area the deepest spot in the Tigris is about ten meters, with an average depth of about five meters. This means that although the area is 170 kilometers upstream from the Persian Gulf, the channel lies below sea level in many spots.

Geologists refer to the Mesopotamian Plain as a "large sedimentary basin" with old deposits buried deep beneath the surface. Much data exists concerning the rate of subsidence, or rate of sedimentation, in this area. Buringh (1957),(17) for example, states that in southern Mesopotamia, generally, a homogeneous layer of silt lies on the surface while underneath it is a dark-colored fossil soil (formerly the surface) in which earthenware fragments and irrigation ditches have been discovered. The rate of accumulation here is quite fast. During only a few days of high water the Tigris River transports four times the amount of sand and silt that the Nile River discharges in an entire year.

The ship that sank after intruding the left bank north of Qurnah during the high water period in May 1855 was probably loaded with about thirty tons of relics. A sunken vessel of that weight probably would not move very far and could even have been buried by silt and sand exactly where it went down. Today, the estimated accumulation rate for the whole area under investigation is ten millimeters or more annually.(18) In a hundred years span, therefore, the accumulation would be one meter. This means that we might expect the ship to be located between one and six meters below the river bottom. This is because the sunken ship lay five meters down at the stern while the bow was...
just breaking the water's surface. If we assume that the river channel has shifted and that the sunken vessel now lies under land, then it should be buried within seven meters of the surface. This is because the land was roughly one meter higher than the water. On our next survey we should not probe about more than seven meters down into the ground. The problem still remains, however, of where to probe.

Perhaps Figures 15 and 16 will aid us. Figure 15 is a geomorphic map based on an aerial photograph taken in 1952. To it has been added data from geological and topographical surveys. The map is not perfect because our survey is not yet complete, but it does provide worthwhile information on the area's geomorphological features. The dotted section designates an old natural levee. Early Islamic remains on the surface indicate that this was already land by at least the twelfth to thirteenth centuries. Thus no matter how much the river channel may have shifted since the Qurnah Disaster in 1855, it probably did not encroach upon this area. In other words, the river stayed within four hundred meters of either bank of the present channel in the region 5.5 kilometers upstream from Qurnah. In the same map notice how long, narrow natural levees project from the Tigris into the marsh. These natural levees are comprised of sand and silt that flowed out of the river channel. Particularly conspicuous is the
- region of natural levees dating from before Early Islamic Period
- flood plain (river channel in recent past)
- flood plain (river channel in very recent past)
- sand bars believed to have been formed in recent past under influence of Burbukh River (presently eroding)
- marsh region
- river channel
- topographic boundary
- national highway
- present villages
- ruins
natural levees that follows along the north side of the Burbukh River near Nahr Burbukh on the right bank. Archaeologists have unearthed many relics here and even the remains of a glass workshop. A similar natural levees paralleling the Tigris River may be seen adjoining the south side of Naif Beg on the left bank. This area is one or two meters higher than the neighboring flood plain along the river and is being cultivated today. Large handworked stones of medium grain size sandstone have been recovered from both these regions.

The above-mentioned flood plain, possibly the location of the river channel in the recent past, is marked by vertical broken lines. Entirely submerged during high water periods, we found this area to be only one meter higher than the water level. The river channel would easily shift more toward the left bank here if it were not for the man-made levee that was built.

The area represented by the randomly scattered dots is slightly more elevated than the flood plain, although dated from about the same age. It is, in effect, a sandbar, formed by silt and sand from the Burbukh River. It sits like a small island in the river. Located exactly 5.5 kilometers north of the confluence on the right bank, this area still contains many unsolved riddles that require more investigation. At present, the Tigris is gradually eroding this section away as it expands its channel further into the right bank.

Another flood plain is shown by the pattern of white dots on black. Several natural levees still remain, suggesting other locations of the river channel in the very recent past. By the way, terms like “recent past” and “very recent past” are used only as rough estimates. We do not have enough information yet to date these topographical structures more precisely, although we can assume that they date since the Early Islamic Period. Three natural levees can be found in the area 5.5 kilometers north of Qurnah. The first lies along the present river channel; the second and third were formed by earlier channels. If we can determine that one of these levees existed in 1855, we may well find the sunken ship buried in front of it. That is why it is so very important to date these levees precisely. As of this report, however, we have not been able to collect enough data. But we have determined that the second levee has a gap in it and that a nearby irrigation ditch no longer reaches the present channel. An old villager recalls that the second levee used to reach all the way to the river. This tells us that within the last hundred years or so the channel was located closer to the left bank than at present. The distance between the first and second levees is
from thirty to fifty meters, meaning that the sunken ship may be buried that far, or possibly further, over from the present channel.

Records show that the ship sank three nautical miles (5.5 kilometers) north of Qurnah, but this figure is not an absolute fact and we are better off giving ourselves some leeway and placing the ship somewhere in the range of four to six kilometers. Moreover, while we can say that the point where the ship sank was most likely to be closer toward the left bank, we cannot conclude yet that the whole area from four to six kilometers is located on the left side of the channel. For example, if the river course had shifted like "old river course II" in Figure 17, the vessel might even be buried in the right bank of the present channel.

Next, I will attempt to mark the possible locations of the sunken ship using Figure 16, one of a set of fourteen Tigris and Euphrates River channel charts done circa 1837\(^{(19)}\) by H. B. Lynch using astronomical observations.\(^{(20)}\) He locates Qurnah at latitude 31°0'22" north and longitude 47°29'18" east. This latitude agrees with that of a 1 to 20,000 scale map made by the Iraq Bureau of Standards in 1952, but the longitude is slightly different.\(^{(21)}\)

Lynch has indicated water depths and village locations. If his chart is accurate, it should provide a closer idea of what the river channel looked like at the time of the Qurnah Disaster than a present-day map would. His map is dated eighteen years earlier than the Disaster. The names Kurna and Mozera, corresponding to Qurnah and Muzairah in Figures 10 and 15, are entered at the confluence of the two rivers. This seems to clear up the problem of whether the reference to "three miles north of Qurnah" meant north of the present city of Qurnah or north of some particular qurnah, a common noun meaning "river confluence." Lynch's old map seems to support the former theory. In the early 1800s, Qurnah was already a well-known city located at

![Fig. 17 Expected examples of Channel shift on the Tigris.](image-url)
Lynch also mentions Rattah Inlet, Karabah Village, although not in the map in Figure 15. He locates it about eighteen kilometers upstream from Qurnah, which corresponds to present-day Nahr-al-Rotah, Huraiba Village. When compared with the Iraq Bureau of Standards map of 1952, Lynch's chart clearly shows that in 1837 the river flowed through what is now a crescent-shaped lake (Az Borbogha). In a little over one hundred years, therefore, the mouth of the Rotah River shifted 1,500 meters to the east. This means that further upstream from Qurnah the river channel shifted substantially more since 1855 than it did in the area of our immediate concern.

If we assume that the small mountain located between Ibn Seriyak and Beni Malik in Figure 16 corresponds to the relic mound Tell Burbukh, located seven kilometers upstream from Qurnah, a comparison with Figures 10 and 15 reveals that the river channel in 1837 had a different bend than it has today. It flowed further away from and through a section of the flood plain on the present left bank. Today the channel gently curves from points B22 to B23 (see Figures 18, 10), touching the left bank and eroding it away. But in Figure 16, the river appears to curve further upstream in the vicinity of B23 to B15, again touching the left bank and eroding it. Because this area corresponds to the “three mile” point north of Qurnah where the relic ship sank, it is possible to imagine the vessel being dashed against the left bank by the strong current. Generally, when a river channel curves, the side of the bed where the current touches the bank deepens and shoals are formed on the opposite side. M. Pillet (1918)
records that the ship struck the bank "three miles" north of Qurnah and sank, its stern coming to rest five meters under water. He notes further that two years later the spot where the boat sank was quite deep — the water being two meters deep only a meter from the bank. This strongly suggests that the ship sank not in the shoals but rather on the left bank of the channel where the current struck the bank. The spot is indicated with x's in Figure 16.

The question is determining the spot that corresponds to this in the present river channel, as shown in Figures 10 and 15. Unfortunately, we cannot pinpoint the spot precisely. One reason is that Figure 16 is not as precise as we hoped. Another reason is that even if the map were sufficiently accurate we still would need at least two stationary references to correlate it with newer maps. We were not able to locate such points. Two relic mounds are indicated in Figure 16, but since they are not named we cannot correlate them for certain with any mounds in Figures 10 or 15. We might guess that the small mountain in Figure 16 is Tell Burbukh but this means we must make the over-worked supposition that since 1855, the confluence point has not shifted. In any event, the spot where the ship sank was likely to have been near Tell Burbukh, some distance from the confluence. And, as explained above, the river channel seven kilometers upstream from Qurnah was further to the left than it is today. There is thus a strong likelihood that the "three mile point" is also inside the present left bank (see Figure 17, "old river course I"). The left bank seems to be the best probable location for the sunken ship, and any river bank survey should begin there, particularly when considering the expenses incurred by digging a trench several meters deep all along the bank. If nothing turned up, we could consider additional water surveys and checks along the right bank. The possibility remains that the river channel may have shifted, as "old river course II," in Figure 17.

B. Interviews and river bank search

Our greatest success in interviews was gaining the information that Abu Sáád and his tribe, who attacked the relic-laden ship, came from the village of Al Naharat (Figure 10, the same as Al Mihralle Village in Figure 16). We also learned from old villagers that many other ships were sunk along the river, although memories only went back about fifty years and hence did not tell us anything directly about the Qurnah Disaster.

When we first began our interviews the atmosphere was uncooperative. But once the villagers realized that they would not be implicated in the actions
of their ancestors they became more willing to talk with us.

The scholars in our group had wondered about the possibility that the relics had been dispersed along the river banks. But while their search of the area centering around the "three mile" point yielded some rock fragments that had obviously been hand-worked, later discussions led to the conclusion that most fragments were probably concrete. Several specimens, however, such as an alabasterlike weathered green rock were worth further investigation.

**Summation**

Our first expedition for surveying the area around Qurnah met with several failures right from the beginning putting our entire operation behind schedule. Some problems could have been avoided if we had been more familiar with local conditions.

Our experiences were invaluable, however, and may very well prove to be the basis for success in our next attempt. The first survey did enable us to narrow down considerably the probable locations of the sunken ship. Moreover, our interviews with the villagers dissolved the apprehension felt by the whole mission that perhaps the ship had already been salvaged secretly.

Lastly, I want to conclude with a short summation of our first expedition's operations.


II. The survey-salvage team determined that the region to survey was between the confluence point of the Tigris and Euphrates Rivers and a point seven kilometers upstream from there, on the Tigris. Surveying operations from the water's surface using a sonostrater were conducted down into the river bed layers. Data analysts then selected twenty-four likely locations in the river bed for closer investigation. Dredging operations and diving probes were next employed to check the designated sites. This provided information on the river bed's geology and let us collect natural and man-made artifacts.

III. Meanwhile, a team of scholars made a comprehensive survey along the river banks, paying particular attention to the topography and geology of the region. The disciplines of history and archaeology were also called into play.
as rocks, bricks, and earthenware fragments were gathered up. Moreover, information about sunken vessels and submerged relics was collected from old people in villages in the area. Scholars also examined related documents and referred to old maps and reports on the Tigris River dating from the nineteenth century.

IV. Despite the combined efforts of our survey-salvage and scholastic teams, we were not able to discover, nor salvage the lost underwater antiquities believed to be buried near Qurnah. This was disappointing, of course, but we hope that our new understanding of the river bed layers and channel shifts in the area, as well as the information yielded from the natural and man-made artifacts recovered, will help us in our next expedition. In our search of the river bank area we acquired much information and material that provided important suggestions regarding shifts in the Tigris’s channel and the location of the lost relics. Accordingly, we are hoping that a careful analysis of the material collected thus far will increase the chances of uncovering the relics near Qurnah. In this sense, we hope that our first survey will mark a giant step toward realizing our final objective.

Fig. 19 Members of the Mission at Qurnah

Iraq's Directorate General of Antiquities, the Society for Near Eastern Studies, Tokyo, and the Chunichi Newspapers (Tokyo Newspapers) all express their satisfaction that the first expedition was completed without accident and that all members of the party returned home safely. Finally, I want to make special note of the generous support and encouragement received from the people of Iraq and Japan. We particularly express our heartfelt gratitude for the gifts of understanding and friendship bestowed by the local inhabitants of Qurnah.
THE SURVEY OF THE UNDER-WATER ANTIQUITIES AT QURNAH

Notes


(2) Place, V., Ninive et à’Assyrie, avec des essais de restauration par Félix Thomas, 3 vols., Paris, 1867-1870.

(3) Loud, G., Khorsabad I: Excavation in the Palace and at a City Gate (OIP XXX VIII), Chicago, 1936.

(4) For contemporary sources on the Qurnah Disaster see Archives Nationales, registration numbers F21 546 and F21 547, “Fouilles sur l'emplacement de l'ancienne Ninive, 1851-1860.”


(6) To dampen the overheated excavating competition between England and France, Place and England’s Rawlinson concluded an agreement which mutually recognized the excavation rights of France at Khorsabad, England at Nimrud, and France in the northern half and England in the southern half of the Kuyunjik site. Despite the agreement, however, England’s Rassam dug in the northern half of Kuyunjik in 1853. He uncovered a relief carving of a king hunting lions and many clay tablet inscriptions from a room that may have served concurrently as a gallery and a library in the palace of King Asshur bani Pal. As reparations for breaking the agreement with France, Rawlinson decided to donate “sixty to seventy masterpieces of Assyrian art” to the Louvre from among the stone sculpture excavated at Kuyunjik by Rassam, excluding only those specimens essential to the British Museum collection. These correspond to the Kuyunjik relics. As part of the agreement between the two parties, the French agreed to transport from Basra back to Europe fifty-two cases of relics excavated by England. These were transported on the boat loaded with relics rescued from the Qurnah Disaster.

(7) Fresnel, Oppert and F. Thomas participated in the “Mesopotamia Media Expedition” dispatched by the French government. They excavated in the central Mesopotamian sites of Babylon and Al. Bils (Bils, i. Nimrud) from 1825. See Oppert, J., Expedition Scientifique en Mesopotami de 1851 à 1854 par Fresnel, Thomas, and Opeert, 2 vols., Paris, 1863. Also, there is one more volume of 25 plates.

(8) The ship was selected by Captain F. Jones, the Commander of British Naval Forces in the area. Captain Jones reported the ship to be fifty tons. Place writes in Ninive et l’Assyrie (see Note 3) that the ship was sixty tons, but in a letter addressed to Minister of State Fauld, he refers to it as a fifty-ton schooner. Thus the ship used in place of the contracted ship was probably close to fifty to sixty tons.

(9) See Figure 9. Zecheiya is located just upstream from Kasra Sadi. Just downstream is Azer.

(10) Three miles equals approximately 4.8 kilometers. If we assume the miles to be nautical miles, the distance would be 5.5 kilometers. One mile equals 1609 meters. One nautical mile equals 1853 meters.

(11) At a point six kilometers north of the confluence at Qurnah, there is a Tell presently called Burbukh. It is located on the right bank just before the river bends widely. Earthenware and glass fragments have been excavated here.

(12) The river bed in the vicinity is made up of layers of either fine or coarse grain mud. During the survey we thought we would find the relics here.

(13) The object itself is not bell-shaped, it is much smaller.

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Uhlig C., “Mesopotamien,” Zeitschrift der Gesellschaft für Erdkunde zu Berlin, pp. 397-430, 1917. Uhlig writes here that near Qurnah the Tigris River is 380 meters wide and ten meters deep, and that the Shat el Arab River is 505 meters wide and 14 meters deep. Today the width of the Tigris near Qurnah is 100 meters.

There are differing theories, but they do not affect the following explanation.


The rate of sedimentation discussed refers not only to the river bank area but is the average rate for the entire Qurnah area, including the marshes. Usually a region’s sedimentation rate is close to its average subsidence rate. The two rates are practically interchangeable.

These measurements may date earlier. At present we are not sure.

For a long while we were unaware of H. B. Lynch’s old maps. At any rate, we were unable to obtain any in Iraq and this map was completed after we returned to Japan. Mr. Fumio Yajima drew the map, basing his drawing on a photograph taken in London.

In longitude the difference is about five kilometers.

M. Pillet records on page 69 (see Note 6) the following report by Commander du Masoneuve, the man who made the final attempt to salvage the ship on February 24, 1857: “...since we deployed armaments, Sheikh Fusain had to abandon any idea of lying in wait for us in the date palms growing along the Tigris.” Hence, as Figure 16 indicates, date palms once grew up to the “three mile” point on the river.

Postscript

This report is based on a talk given by Namio Egami entitled “The Salvage of the Underwater Antiquities at Qurnah” on May 27, 1972, at the monthly lecture meeting of the Society for Near Eastern Studies, Japan and compiled by Mihoko Dōmyō, Yō Uesugi, Asashirō Saigusa and Takashi Soma.

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1. Qurnah, confluence point of the Tigris and the Euphrates
2. Unloading instruments

3. Control of instruments

4. Hydrophone of the sonostrater
5. The sonostrater in action

6. The sonostrater set in the boat

7. Traverse
8. Diving with aqualung

9. Setting bouys

10. Excavation by a dredger

11. Driver with boring-stick
12. The Tigris and the wide left bank

13. Research of banks

14. N. Egami researching the soil
15. Visit of Dr. I. Salman and Mr. F. Safar

16. Meeting of the members

17. Informations from the old men in the villages
18. View of the ferry, Qurunah

19. View of bazaar, Qurunah
20. Statue of bull with human head, excavated at Khorsabad