

VRG\_Folder\_0907

2823 f



1.81

2823 f

1.05

2823 f

1.04

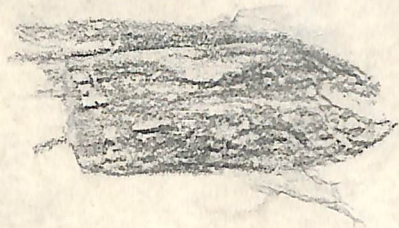
282

1.02

2823 f

1.0

Im 2823 f 1.02







2823 f

1.03

19

1.04

2823p



1.05



2823 f





1.06 b

2823 f

2.01

2823e





2.01

2823e

2823e

2.04

2.05

2.03

2823e

2.02

2823e

9012

2823 e

2.02



2823e



2.03



28232

2.04



2823e



2.05

2823e

2.06





2.076

2823 e

2823 d



3.01

2823 d

3.03

3.06

2823 d

h<sup>o</sup>.

3.02

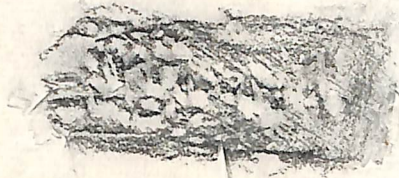


h<sup>o</sup> 2823 D

Im. 2823d



3.03



3.04



2823 d

2823 d

3.05



2823d

3.06





4.01

2823 c

4.01

2823 C

C 8888

I

2823 C  
4.03  
4.05

2823c

4.02



4.03



2823c

4.09

Im-2823c



4.05.



2823



C





4.066

28 23c



"The happy divers stay ecstatic and enchanted..."

Rear Admiral Th. Voutsaras (Ret.) R.H. 11.





## CHINESE NAVY NEWSLETTER

A very informal report to everybody

I hate to begin any screed with an apology followed by an excuse, but here take the liberty of doing so.

Last December when I was in America, Walter Feinberg, long a supporter of ours, read me the riot act for not keeping in touch. Well, Walter, I try. But there are just too many names on the list for us to manage individual letters at very regular intervals.

I've just been going over the mailing and keep in touch list; there are several hundred names on it. Look, said Jane Lawrence, who is working part time helping to clean up the horrible heaps of paper in the office, they can't all be important - let's go through and sort them out.

We tried. It doesn't work. Is the man who took the whole expedition to dinner and keeps writing to wish us luck less concerned than a professor in Japan who cares about anchors? All these people have given their time or money or both.

So, with apologies, this group letter. It will be too personal for some, not personal enough for others, too technical or not technical enough for still others.

I have written up a short description of this summer's project, which is either enclosed or will be sent separately. The gist of it is that we intend to survey in South Italy, and perhaps in Greece as well. The idea in 1969 and 1970 is to avoid large and complicated projects and work with a basic small crew, using Archangel as a working base.

As Archangel can only sleep six comfortably over long periods of time, we must limit the crew to people who can do several jobs and who are used to working together.

As everybody knows, it has been a principle with me that the project should be open to anybody with a serious interest in working on it. I still feel strongly about this, because some of the best people coming out of the project and meaning to go on with marine archaeology are those who began with no particular qualifications.

So, we have to strike a balance between being available to those who are really interested, and not recruiting too many people. In an organization like ours, which has no permanent staff, little money for administration, and cannot plan ahead very effectively since we seldom know exactly how much money we will have for each summer's work, things sometimes get fouled up. (Thus the 'Chinese Navy', from the old Chinese fire drill jokes, where things work backwards, upside down, or not at all.) When this happens, extra people are a burden.

The tentative crew list for 1969 follows below. All of them except Costas Koronelis are divers, can handle several jobs, and have already worked together for two full seasons. They all speak both Demotic Greek and Italian.

- 1) Peter Throckmorton, director
- 2) William Phelps, associate director, archaeologist
- 3) Diana Wood, draftsman, archaeologist
- 4) Joseph Conroy, draftsman



- 5) Kim Hart, chief diver, photographer
- 6) Joan Throckmorton, draftsman
- 7) Costas Koronelis, engineer
- 8) Mark Potok, maintenance

In addition to this basic crew we have several tentative and temporary people signed up. These are

- 9) Terry Vose, technical assistant. Terry is going to Ceylon this spring, and will join us if he gets back in time.
- 10) Alan Bax. Lt. Cdr. Bax is a serving Royal Navy officer and qualified diver who is associated with the Institute of Archaeology's marine archaeology programs in London. He will be with us for six weeks, both to fill in as part time captain of Archangel and to work with us for the experience.
- 11) Stan Machtlin, who is a diver, MD and practicing psychologist. He is interested in diving medicine and wants to join us for six weeks. His wife is a draftsman as well.
- 12) Lilla Brownstone and Noma Coply want to visit and work if there is work to do. (There are several others in this category.) They are both experienced draftsmen and have worked on archaeological excavations.
- 13) Gerhard Kapitan, who will be with us a good deal of the time. Many of the wrecks we are chasing are ones he has located.
- 14) Larry L. Wherry, an electronics technician from Honolulu.
- 15) Dr. Loesher of the Wild Heerbrugg A.G., a photogrammetry specialist.

#### TORRE SGARRATA

Bill Phelps and Joan and Peter Throckmorton are working hard to get out a preliminary report on Torre Sgarrata to supplement the article in the February National Geographic.

Joan has been working out the statistics of the whole Torre Sgarrata operation, what it cost altogether, per day, per diving hour, etc. The results are very interesting. A preliminary condensation is given below and a formal financial report will be made, but for this we need an accountant to help us get it into final shape. Totals are approximate, though not far off the mark, mainly because 10 days' exploration and evaluation of the site in 1965 were not accounted for separately from that season's other projects in the Taranto area. These figures are for those ten days, plus the seasons of 1967 and 1968.

Total work days (one day, one man), including preparation and clean-up time in Italy.....	3850
Diving hours .....	1355
Total operating expenses 1965, 1967 and 1968.....	\$26,528
Value of equipment worn out at Torre Sgarrata, now surplus, which must be replaced before 1969 and 1970 work is possible, approximately..	1,500
Administration cost including travel, post-expedition postage, photo printing, etc.....	2,100

---

Total... \$30,128

Total indebtedness of expedition .... \$3,650

Expedition equipment and cash on hand ..... \$4,800



About 75% of all diving was done by the divers of the basic crew: Kim Hart, Peter Throckmorton, Joan Throckmorton, Diana Wood, Terry Vose, Bill Phelps, Sam Low, John Youngman and James Ward. Forty other divers did the other 25%.

It was expedition policy that any visitor who was qualified could dive on the wreck, and expedition members who were not involved in diving duties were encouraged to dive as well. Thus perhaps half of the 25% was visitors' or training diving done by people who could do little effective work in the short time that they were diving. Considering that many of the training divers were students or archaeologists, the loss of efficiency involved in allowing them to work on the wreck seems well worthwhile.

Most dives by extraneous people were made on the butt ends of tanks of air, and when it was convenient to do so. Therefore, although the diving statistics show a considerable loss of efficiency here, the figures are probably not a very accurate indication of the cost of allowing the "extra" people to dive.

Total diving time breaks down as follows:

excavation of sand .....	850	hours	40	minutes
surveying .....	231	"	28	"
photographing .....	35	"	42	"
raising of stone .....	97	"	25	"
raising of wood .....	44	"	37	"

The rest of the time was spent in teaching, learning, or inspection of the site.

We will continue to work on these figures, and will distribute them when they are "official".

Working underbudgeted is not economical in the long run. In 1967 we had on hand, at the beginning of the summer, about one third of the necessary money. In 1968 we only raised about half of what we judged to be the bare minimum.

As a result, we worked less efficiently than we might have. For instance, it is all very well to be clever about feeding large groups of people on little money. But even Joan cannot produce decent meals for much under one dollar per day per person, and there were times during both years when we fed the crew on less than that. During the hungry times people got sick more often than they should have, work time was lost, and thus the money saved in feeding people rice instead of beefsteak was in effect lost. Too much economizing is a ruinous extravagance.

Working with a small crew, from Archangel, is much more efficient than working from shore. Efficiency rose as numbers of people went down. In 1968, for instance, too little money too late meant that Archangel arrived late. When she finally arrived and her machinery shook down, we did a lot of work in a short time at low cost, even though the weather was very bad. Thirteen working days were lost in the month of August alone, due to continual squalls and bad weather from the south. Only one day was lost because of weather during the same month in 1967.

Whatever the defects of our work at Torre Sgarrata, we can be proud of the excavation as an overall accomplishment. Except for George Bass' Yassi Ada excavation, Torre Sgarrata is the only ancient shipwreck to have been completely excavated by divers, and the only Roman ship to have its wooden remains completely drawn underwater so that they can be partially reconstructed. So far as I know, we have put in more hours on the bottom than any other group of archaeological divers on a ship site, and at less cost.

We have not yet arranged for final publication of the wreck. This is because at least another year or two must go by before the material from the wreck is completely studied.



We hope that our final publication of the material will resemble George Bass' final publication of the Cape Galidonya wreck, which came out as a Transaction of the American Philosophical Society (vol 57 part 8 1967).

Its projected outline is as follows:

THE TORRE SGARRATA WRECK: a late second century Roman ship

Edited by Peter Throckmorton, John Ward Perkins, and  
William Phelps

Chapter One

Discovery of the wreck and research on other ancient ships with cargoes of stone, by Peter Throckmorton. It will describe the Methone and San Pietro wrecks, and the research which led to the discovery of the Torre Sgarrata wreck.

Chapter Two

Techniques of excavation, by Peter Throckmorton.

Chapter Three

The pottery, by John Hayes and William Phelps.

Chapter Four

The cargo, by Professor John Ward Perkins, Director, British School at Rome.

Chapter Five

The ship, by Peter Throckmorton

Chapter Six

The coins, by Professor Attilio Stazio, Department of Numismatics, University of Bari.

Chapter Seven

Miscellaneous small finds

- a) The North African amphoras, by Dr. Fausto Zevi, Ostia Museum
- b) The mason's tools, by Joseph Shaw
- c) The Roman armor, by ????

Chapter Eight

General conclusions, by John Ward Perkins

Appendix One

Expedition administration, by Joan Throckmorton



TORRE SGARRATA POTTERY  
AND SMALL FINDS

(Bill Phelps took time off from his other work to write an interim report on his work on the pottery.)

Since only small fragments of the hull of the ship were preserved, where they were trapped underneath the sarcophagi, it is not surprising that the quantity of pottery and small finds brought up in the course of the excavation was not so great as we would have liked. The worn and fragmentary condition of most of the marble slabs, which formed an important part of the cargo, is matched by that of the pottery remains. Nevertheless, although the total is small, enough sherds were preserved in a reasonable condition to enable a considerable range of wares and types to be distinguished.

The material has been drawn and catalogued, but not yet studied, so that at present only a general picture can be given. Much, if not most of it, appears to originate in Asia Minor and North Africa. Very little work has been done in these areas on the common household wares and storage vessels which constitute the bulk of the ceramic industry, even less has been published, and stratigraphical evidence is virtually non-existent. The wreck, therefore, can supply valuable chronological evidence for the pottery found on it, since a wreck, unlike some forms of tomb, is a closed context.

And while the life of a merchant ship in antiquity may have been as long as a century, though I consider this most unlikely as an average, the life of the earthenware vessels on board would be much less. Some fragments of broken pots may easily have found their way into the bilges, or lodged behind the inner lining between the frames, but it is improbable that the quantity of sherds thus preserved from the early days of the ship would be great. It is more reasonable to assume that by far the greatest proportion will date from at least the last quarter of a century preceeding the wreck, if not less.

But to track down and locate the sources of the pottery will involve considerable research, if we are to extract the maximum of information which such a wreck can and should afford.

Small finds, apart from the bronze or copper nails, and the concretions of iron nails, which are mentioned elsewhere, were few. Most interesting and unique is a complete wooden mallet, either a carpenter's or a mason's tool. A curious surved and perforated bronze strap, perfectly preserved, may be part of a soldier's shoulder harness.

Two or three fragments of glass, including a small ring base, were found, but not enough to tell us much.

A number of clay abacus beads, such as are frequently found on wrecks of the period as well as on land sites, turned up. The abacus was used by engineers and merchants from Egyptian and Classical times in the Mediterranean.

The pottery represented by those sherds that were not too sea worn to identify, ranged from the largest amphorae down to the finest of red-slipped table wares. There were fragile jars with walls only 2 mm. thick, heavier bowls in many sizes, cooking pots and casseroles, large storage jars; and the variety of fabrics evident in the better preserved sherds is even greater when the worn ones are included.

Three sherds are particularly interesting. They are from at least two jugs with a brown lead glaze slip. A sherd of similar ware was found a few years ago on



another wreck that had in its cargo sarcophagi from the same district in Asia Minor, and which lies a few miles to the south of Torre Sgarata. So far, preliminary investigations have failed to discover the provenance of this ware anywhere in the Mediterranean. It is quite distinct from the eighth century Byzantine brown glaze, as it is both in forms and colour from the earlier green glaze which had a short popular vogue in the Near East. Its origin is a mystery at the moment, but it is of the greatest archaeological interest.

The red slipped bowls and plates include wares from Tschandarli or Pergamon and from North Africa. The presence of the first is significant in view of the well preserved coin of Marcus Commodus from Lesbos. Northwest Anatolia may well be the home of some of our other pottery. And among the red slipped rouletted bowls of North African ware are two or three of a well known and widely exported type which is securely dated to the last seventy years or so of the second century.

Of the various bowls and jars little can be said at the moment. And the same applies to the amphorae, except for one type, of distinctive ware and profile, which occurs at Ostium and elsewhere, but the origin of which has until recently been unknown. Recent research suggests that it may have been made in Tripolitania for the flourishing export trade in oil that is known to have grown up there in the second century.

A brief examination of the sherds has shown that at least fourteen amphorae can be distinguished, which all had an internal coating of resin or some similar material. Samples are being analysed. We estimate that there are probably as many again uncoated ones. As in the case of the coarse bowls and jars, the fabric of some of the amphorae appears to be foreign to an Italian context, and Asia Minor, North Africa, or even further afield are likely sources.

A few miscellaneous finds of some interest complete the list. There were several kinds of roof tile, ridged and convex, some with traces of mortar still adhering, showing that they were indeed used for roofing, a theory that has been doubted in the past. Flat bricks no doubt came from the galley floor. A small quantity of teeth and bone fragments from pig, sheep and cow, provides evidence that the diet of some of the ship's complement was not so austere on these last voyages. And finally, two or three fragments of human bone must belong to one or more of the ill-fated voyagers whose grave stones were the white marble sarcophagi lying, some of them, still stacked, on the sand beneath the sea.

\*\*\*

Many of the overall drawings have been completed. All of the wood has been drawn, although we will want to work on the material now preserved in the temporary museum at Taranto before making any final conclusions.

However, a few generalities can be made at this point about the ship. Robin Piercy, a qualified quantity surveyor, calculated the amount of cargo she carried at 160 tons plus. ~~This bears out the conclusion from the drawings and measurements,~~ that she was a large vessel. On present evidence I would estimate her gross tonnage as not less than 250 and her overall length as not under 30 meters.

With the exception of the Nemi ships, she is, at least in terms of her construction, the largest Roman ship found to date.

Her construction is unique. The materials used, which have been analyzed by Mr. B. Francis Kukachka of the USDA Forest Products Laboratory, seem to come from the southern part of the Mediterranean, especially the packing branches used to fill out her gunwales. The packing branches are tamarix, which is usually found in Egypt and Syria.

Techniques of construction are certainly different from techniques used in ships which we think were built in Italy. Indeed, they are unique. They are



characterized by minimal use of bronze nails below the waterline (the ship was mainly held together by wooden treenails), and very fine carpenter work. She was definitely a "shell first" ship.

Here at Torre Sgarata we see, for the first time in an excavation, the wales of a roman ship, and the great elmwood step for the artemon.

Radiocarbon dating of the pine planking indicates that the ship was old when she sank. Other evidence in this direction is the inferior wood patching over what must have been leaky places in an old hull, fastened with iron nails. The ship itself, then, is an important chapter in the history of Naval Architecture.

#### The Drawings

- No. 1. John Youngman and Roger Wallihans' tape triangulation of the marble blocks as they were uncovered. When we first saw the wreck only parts of blocks nos. 2, 6, 3 and 4 were visible.  
  
All the blocks were marble, except for nos. 35, 26, and 23, which were calcite, or "alabastro orientale".
- No. 2. (Interim sketch). The site, after part of the marble blocks have been removed, in September 1967. Remaining wood is marked W.
- No. 3. Detail of wood remaining at the N end of the wreck.
- No. 4. Section run across No. 2, showing wood in place. The ship has opened right out and what was once a curved hull lies flat under the cargo of sarcophagi.
- No. 5. IAG - The only remaining part of the Keelson. (See section, drawing 4.)
- No. 6. Planking in NE corner of the wreck under sarcophagi nos. 3 and 4. The dark hatched transverse pieces are frames, with the remnants of interior stringers shown above them in white. Treenails for holding planks to frames shown in black, tenon treenails in white. This was the largest and best preserved patch of planking.
- No. 7. Other planking at NW corner of the wreck. Same as No. 6.
- No. 8. The wales: probably at the starboard bow of the ship. EIF is the waterline wale, IAL probably the bulwark. Nail convention same as in planking drawings. IAA is the Artemon step, as found in place.
- No. 9. Central part of wreck. Patched plank is under block no. 17.
- No. 10. The Artemon step in place.



- No.11 Detail of planking showing tenons, tenon slots, treenails for fastening frames driven through planking, tenon assemblies.
- No.12 and No.13 Details of patch on planking fastened with iron nails.
- No.14 Section of wales shown in drawing No.8.
- No.15 Reconstruction of planking in No.7. Of especial interest here is the butt end joint at the lower left side of the drawing, which resembles techniques used in the Nemi ships. The TSG planking and the Nemi planking is here drawn to the same scale, so that a comparison can be made.

(Note: Nailholes enlarged in order to be visible on small scale reproduction.)

#### PERSONNEL

For this report we have divided the people who worked on the project into three groups: Archaeology, Diving/Technical/Boat, and Household. This is a difficult division to make because most of the basic crew fits into two or more of these groupings. We have tried to make a list, therefore, which illustrates the difference between TSG and a land project. The Archaeology group consists of the people who probably would have been present in a normal land excavation; the Diving/Technical/Boat group are those who would probably not have been present if this had not been an undersea operation.

Titles are not given. It is expedition policy to first-name all expedition members and no-one has any "rank" except the head of a department. Thus it is a perfectly normal occurrence in the organization for a senior academic person to find himself working for a department head who was a student in real life.

The average expedition senior member is 30 years old, has a university degree, and is working toward a Ph.D. Nearly all the members of the Archaeology Section have Bachelors Degrees, and most will have Ph.D.s within three years. A quarter of them are actively teaching in Universities. Nine members of the Technical Group have Engineering Degrees. The group also includes one senior Regular Army Officer now doing an advanced degree, one Degree in Law, one Ph.D. in English and several others who never finished high school.

(Note: Two-year people are listed in capitals; working divers are indicated with a \*; "T" = Trainee, and signifies those who learnt to dive at TSG.)



Archaeology

		Diving Hours	
Joseph Carter	Archaeology Student/Photographer	33.33	T
JOSEPH CONROY	Draftsman	1.57	T
Keith de Vries	Archaeology Student	2.16	T
Michele Guglielmi	Archaeology Student	2.44	
GERHARD KAPITAN	Archaeologist		
HELENA LATANZA	Archaeologist	22.26	T
Mario Lazzarini	Archaeology Student	.30	T
David Leigh	Conservationist	99.38	*
SANFORD LOW	Archaeology Student		
Anna McCann	Archaeologist	2.54	T
Terry McClintoch	Archaeology Student		
Terje Olsen	Photographer	2.34	*
Toby Parker	Archaeologist	5.13	*
Ora Patoharju	Archaeologist/Engineer	93.28	*
WILLIAM PHELPS	Associate Director/Archaeologist	13.59	*
Robin Piercy	Quantity Surveyor	8.55	T
Robin Phillips	Architect	19.54	*
JOHANN REINHART	Anthropology Student	0.32	
Dominic Ruegge	Archaeologist	36.05	*
Mary Russell	Archaeology Student/Assistant		
Brian Thompson	Draftsman	139.01	*
JOAN THROCKMORTON	Draftsman/Administrative Assistant	39.34	*
Roger Wallihan	Architect/Engineer		
Pier Wiik	Photographer/Technician	76.22	T
DIANA WOOD	Archaeologist/Draftsman	8.00	*
Laina Wylde	Draftsman/Archaeology Student	22.33	*
JOHN YOUNGMAN	Architect		

Diving/Technical/Boat

Robert Brammah	R.A.F.	1.07	*
John Bullitt	Diver	6.00	*
Michael Dallas	Engineer	12.47	*
David Davidson	Student	3.02	*
Ian Drewett	R.A.F.		
Claude Duthuit	Diver	12.00	*
Robert Firth	R.A.F.	.50	*
Ben Fuller	Engineer/Seaman	13.19	T
S.A.C. Green	R.A.F.		
Timothy Green	Training Diver	14.50	T
Richard Heagerty	Engineer/Seaman	10.50	*
Paul Helmle	Student	.11	
Anthony Herman	Seaman	7.24	T
Roger Howells	R.A.F.	.59	*
ALAN KIM HART	Photographer	240.00	*
Michael Jakeman	R.A.F.	.45	*
David Lewis	Diver	12.00	*
Warren Lewis	Student	9.00	*
Emmanuel Maltesos	Bos'un		
John Marshall	Photographer	12.00	*



- 10 -

Diving/Technical/Boat, cont.Diving  
Hours

S.A.C. Mitchell	R.A.F.		
John Morris	R.A.F.		
MARK POTOK	Seaman	21.02	T
Peter Hiley	Engineer Seaman	19.18	*
Gino Sabonaro	Seaman	12.00	*
Joseph Scherschel	Photographer, National Geographic	1.26	*
PETER THROCKMORTON	Director	110.45	*
Geoffrey Tubby	Engineer		
Michael Valintinos	Technical Assistant	6.00	*
ROBERT VOSE	Technical Assistant	139.46	T
Michael Walton	Student	8.23	*
JAMES WARD	Engineer (Chief Eng. <u>Archangel</u> )	63.47	*
Charles Haldeman	Seaman		

Household

Sally Browne			
Anne Carter			
Godfrey Duncan			
Randy Kristiansen			
Elizabeth Laba		22.49	T
JANE LAWRENCE			
PHILIPPA MITCHELL			
Annalisa Pataharju		2.03	*
SARA POTOK		2.15	T
Annie Rooney		18.38	T
Dani Rosen			
Elizabeth Scherschel			
LUCY THROCKMORTON			
PAULA THROCKMORTON			
Cosima			
Giovanna			



# SPONSORS

The basic seed money that made the project possible came from the University Museum and the Lucius Littauer Foundation. The seed sprouted, but just barely and TSG was always seriously underbudgeted. A whole series of people applied their several sorts of first aid to keep the project on its feet.

Fred Leonard noticed that a diet of spaghetti was getting a bit monotonous and gave us a \$150.00 cheque, directing that it be spent on MEAT. Mrs. Quincy Shaw cabled us the \$500.00 we needed in an emergency. to purchase a quarter mile of compressor hose. The Costa Brothers, drilling engineers in Taranto, found a necessary air compressor for us at half price, and gave us two years to pay for it. George DeVitis, also of Taranto, was the rock on which the whole expedition stood when flat broke. At one time we owed him thousands, and he never questioned us.

Halstead VanderPoel persuaded Union Carbide to give us carbide. Edwin Link gave us \$1000.00 when in the middle of an expensive research project of his own. Marcello Nisi donated his house to us, and had it cleaned out and whitewashed to boot. Jack Wylde saved us several times with \$500.00 donations, besides contributing his daughter Laina. The Oxford University diving group left us what must have been enough milk to float Archangel.

Charles Chaplin of the Catherwood Foundation, and Harry Starr of the Littauer Foundation responded nobly to cables which read, in effect, HELP. The whole precarious project was the recipient of another kind of financial support, which does not appear in any accounting: the contributions of the individual expedition members who contributed what they could, to their project, without telling us.

Of the 75 expedition members, everyone gave his or her time and nearly all paid their own travel expenses. What salaries were paid went to essential technicians who could not have joined us without some help. The average salary was, with expenses, under three dollars per day.

This help, in terms of its worth to a commercial project, would more than double the total cost. Some of the engineers and technicians who gave their time to the project are worth, in the labour market, over \$1000 per month.

## Organizations which helped the project.

The Italian Navy

The Italian Archaeological Service

The University of Pennsylvania Museum

The British School of Archaeology at Rome.



Technisub Company of Genoa

7 Mare, of Rome

The Nikon Company (Ehrenreich Optical Co.)

The Dacor Corporation

Translochi De Vitis of Taranto

Ditte Costa ve Hernano of Taranto

Ristorante Sabonaro, of Campo Marino

Lido Sylvana Camping of Pulsano

Epirotiki Lines (Piraeus)

Union Carbide Corporation

The National Geographic Society

The Nikos Kartelias Diving Center (Piraeus)

Leonidopoulos & Sons, Piraeus.

Lockwood Insurance

We are especially indebted to the following individuals for their help to us: Patty Wylde and John Marshall who have done us more kindnesses and favours in America than we can list; Bob Lockwood, who must have spent many dozens of hours trying to do the almost impossible - find us insurance for divers at something less than skyrocket rates; Admiral Salvatore Pelosi; Generale (i.e. Rear Admiral); Mario Ingrevalle; Colonello Impagnatiello; Commandante Grifoni and Commandante Pomponi of the Italian Navy, and to many other individuals in Admiral Pelosi's Command.

Miss Anna Fazzari of the British School at Rome; Bruno Vailati and the staff of 7 Mare; Luigi Ferraro of Technisub; and George De Vitis.

Professors Attilio Stazio and Gino Felici Loporto. Helena Latanza and the staff of the Taranto Museum, especially Assistants Campi and Marturano.

A full list of the people who helped us in Taranto would practically fill the Taranto phone book.

A last note of thanks must go to the Banks who handled our money, and who were invariably sympathetic and helpful when confronted with our tangled finances. These are the United States Trust Company of New York, one of whose Assistant Managers, George Wick, saved us from disaster several times; the First National City Bank of New York, whose Piraeus Manager, Thomas Shortell's, helpfulness saved us again, and the Banco Commerciale Italiano of Taranto Branch.

The University of Pennsylvania



The Project was financed by the following institutions:

The Lucius Littauer Foundation

The Old Dominion Foundation

The Catherwood Foundation

The University of Pennsylvania Museum

The United States Liason Committee for Oceanographic Research

The Estate of Lucy Norton Badger

And by contributions from the following individuals:

Mr. and Mrs. Quincy Shaw, John I. Wylde, Edwin Link, Carl Landegger, Harry Kahn, Anthony Besse, Peter Gimbel, George Devitis.

Donations were also made by David Bartlett, Fred Leonard, Harold Edgerton, Mrs. Thatcher, Mr. and Mrs. Marcello Nisi, Walter Feinberg and many others. Some who want to be anonymous, others like the local farmer who gave us five gallons of red wine, or the visitor who brought us a dinner (a pretty serious invitation, when the crew was sometimes 25 people).

A complete acknowledgement must wait until the final publication.

#### CONCLUSIONS:

It is not for us to say whether or not we have done a good job of archaeology. Naturally, we think we have. But so did Schleimann. We've learned a lot. Some things can certainly be done better and cheaper.

I do think that we have shown that a mixed crew of Greeks, Italians, Americans, Englishmen and Australians, with an admixture of Finns, Norwegians and Frenchmen, can work well together. That given skilled department heads, volunteers can do good work underwater.

Dozens of wrecks are being destroyed every year because it is administratively difficult to work on them scientifically. There are few trained marine archaeologists, and little money for this work. I hope that we have done something to convince everybody that good work is possible, given the kind of support we had at Torre Sgarrata.



ARCHANGEL

Archangel was purchased in the Spring of 1967, with the help of the United States Liaison Committee for Oceanographic Research and with the especial help of the late James Dugan.

She had been an island cargo boat, built in 1946, and had been used almost all her life in the lemon trade, carrying lemons from Poros to Thessalonica. She was very heavily constructed of Cyprus - on Grown Hardwood (Mulberry) frames.

As originally bought, she was fitted with a one-cylinder, Greek built, thirty horsepower engine which drove her at six knots, and set up a tremendous vibration which made writing or careful navigation impossible, and covered everything and everybody with grease, oil and exhaust fumes. She had no accommodation.

We made a minimum conversion in 1967, sailed her to Italy, and used her there, where she was eminently successful. She also proved to be a very good sea boat.

At the end of 1967, we knew pretty well what she needed in order to suit our purposes. Therefore we decided to survey her in the winter of 1967-68 and convert her as a small research vessel if she was found sound.

She was carefully gone over by a series of shipwrights, and Lloyds surveyors and pronounced sound. In the spring and early summer of 1968, the following work was then undertaken:

Boat was stripped from end to end, one cylinder engine was removed and sold.

Hull was burnt off, carefully inspected, all iron bolts were replaced and some fastenings replaced with wrought iron ship nails.

New engine, a Kelvin K3, 66 HP Diesel, which had been installed on the MY Thelginus for Mr. Bergius, owner of the Kelvin Company in 1947, was obtained from the owners of the Thelginus, Messrs. Potiamanos of Epirotiki Lines.

The engine was stripped to crankshaft, inspected and all crucial points measured by the Kelvin Company's representatives in Piraeus, Messrs. Leonidopoulos. All worn parts, or parts likely to have suffered metal fatigue, were replaced. The rebuilt engine was installed under the supervision of Harry and Byron Leonidopoulos and a Lloyds Inspector.

Auxiliary Machinery

LP Compressor - Requirement was for a water cooled unit that could produce 3 atmospheres at about 1M/3. After much exploration of salvage yards we found a suitable unit, pulled its plate off, and found crank and piston to be in very good shape. It was an English Broome and Wade Unit. When we wrote to the manufacturers we were informed that it had been built in 1931. This was rebuilt, and installed, and ran beautifully all summer on a belt drive from the flywheel of the main engine.

HP Compressors - A British built Heavell three stage HP, water cooled, compressor was found in another salvage yard. This was coupled to a two cylinder 9 HP Petter diesel which we salvaged and rebuilt, (the unit was designed by James Ward and Harry Leonidopoulos) and installed in the



engine room. It produces enough air to fill a double tank every 20 minutes, through a cascade system of commercial oxygen bottles. HP piping to naval standards was installed and inspected by the torpedo shop personnel of the Taranto Naval Dockyard. Air to tanks can be tapped on deck, and an alternate HF-LP conversion manifold makes it possible to tap LP air for Nergile or Recompression chambers.

Recompression Chamber was installed in the main cabin in such a way that it could be removed. It is flanged to connect with the Greek Navy's chamber at the Piraeus Naval Hospital, and several Italian Navy chambers, at Catania, La Spezia, and Palermo.

Air supply to the chamber is through LP Air Filters supplied by Messrs. Galeazzi, the manufacturers of the chamber.

Radio and Electrical - A used 70 Watt output SIMRAD (Swedish) radio telephone was obtained, checked, and installed. Batteries for engine starting, radio and domestic circuits are NIFE nickel cadmium in a 24 Volt system. These can be charged either by a generator attached to the main engine or to a 50 watt generator which attaches to the Petter which drives the HP Compressor.

Accommodation - Archangel sleeps 8. A new coachroof was installed, four bunks were set into the foc'sle with lockers. The main cabin, once the cargo hold, was made into a u-shaped settee with a large table which converts to a double bed, on the starboard side, and a single bed on the port side. Further aft, a large chart table was installed on the starboard side, with a work and galley table to port, with lockers.

In addition, a bunk was installed in the converted wheel house, with another bunk in the storeroom behind the engine room.

Galley - A sponge diver depot tboat type oil-drum galley, which runs off bottle gas, was installed on deck, with a large locker. This makes cooking much simpler and cleaner when there are large groups of people on deck and the ship is moored.

When making a passage or in bad weather, cooking can go on on the saloon work table, which also has a sink and an ice-box.

Deck Structures - Coach roofs over hatch coamings and wheel house were made up of waterproof plywood fibreglassed over for maximum strength. These are removable if necessary, which makes it simple to remove machinery from the engine room for repairs, or to remove recompression chamber from the main hatch. If necessary the boat can be converted to a cargo boat in a few hours.

Rig - Converted from a Gaff Sloop, with a very large mainsail to a Staysail Schooner. The Schooner rig is intended as auxiliary sail only, although Archangel performs quite well under sail alone with the wind on or abaft the beam.

Winch - A small cargo winch which uses the staysail boom can handle up to 500 KG, and a geared hand anchor winch is installed forward.

Mooring Gear - 2 mooring anchors, two fisherman type anchors with 30 fathoms of chain in each hawse, two kedge anchors, 100 fathoms nylon mooring line.

All new construction is pitch pine, oregon pine, waterproof ply and teak. All fastenings, screws, fittings, etc., yellow metal, etc.



RY ARCHANGEL

Auxiliary staysail schooner.

Specifications as of Spring 1969

Perama type converted Greek cargo boat.

Length overall - 14.85 metres inside stem post to inside stern post

Width - 4.81 "

Draft - 1.70 "

Length of Keel - 11.15 "

Height of masts to Nock 6.50 metres

" " " " Truck 10.05 "

Main engine - 66 HP Kelvin K3

Auxiliary - 9 HP Petter 2-cylinder

Speed under power and sail - 7.5 Knots.

Average speed 1968 in all weather conditions - 7.2 knots.

Accommodation - Sleeps 8, four in Foc'sle, two or three in main cabin,  
two in wheelhouse and after storeroom (crew's accommodation)



RY ARCHANGELInventory Spring 1969. With approximate valuation  
for Insurance.

1. <u>Navigation Equipment.</u>	\$
Charts (Admiralty folios for Med.) and Pilot Books	200
Binoculars .....	50
Sextant .....	100
Compass .....	50
Bearing Compass .....	50
Dividers, parallel rules, pilot books .....	100
Barometer .....	30
Clock .....	40
Taffrail Log and Spinner .....	75
Aldis Lamp .....	50
Signal Flags .....	20
Navigation Lights .....	50
Radio Telephone .....	500
2. <u>Safety Equipment (to exceed Board of Trade).</u>	
Life Jackets (20 USCG Standard, Kapok) .....	100
Flares, Rockets, Smokes, etc. ....	100
Emergency Transmitter (New BOT Standard) .....	500
Fire Extinguishers, 2 foam, 1 Co2 .....	60
3. Main Engine and Fuel Tanks, Nickel Cadmium Battery Bank, etc. ....	4,500
4. Hull with improvements: refastening, deck houses, etc. ....	5,000
5. Masts, Rigging, Sails, etc. ....	1,500
6. Anchors, Winches, Chain, Nylon Mooring, Cable, etc. ....	500



Inventory cont.

7. Galley, Cutlery, Plates, Cooking gear, etc. ....	100
8. Blankets, Sheets, Mattresses, etc. ....	200
9. Stores on Board .....	300
10. Bingly and Outboard Motor .....	300

TOTAL BOAT VALUE FOR INSURANCE

\$ 14,475

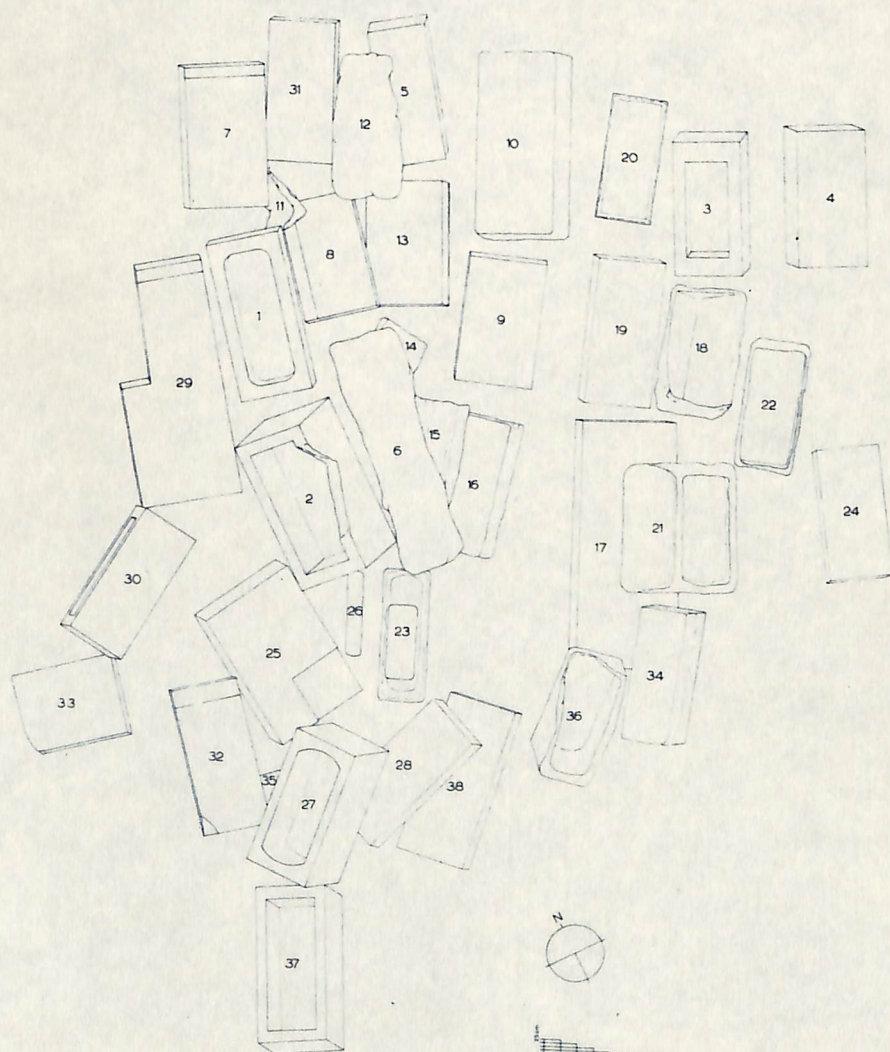
On Board Equipment for Diving: Insured Seperately

1. Recompreseion Chamber	1,500
2. Diving Equipment: tanks, suits, regulators (Ordered Spring 1969 but not yet delivered)	2,000
3. High Pressure Compressor with Petter Engine, Volume Tanks, and HP Piping .....	2,000
4. Low Pressure Compressor with Filters, Hose, Airlift Piping, etc. ....	700

TOTAL

\$ 6,200

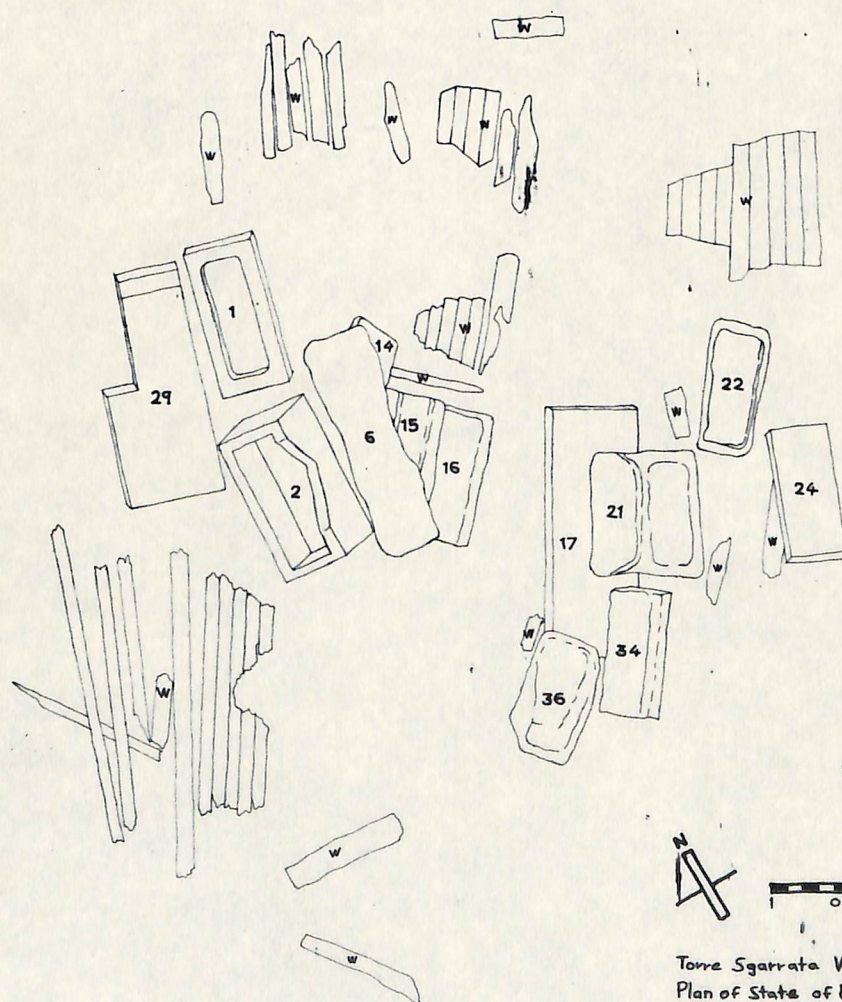




TORRE SGARATA WRECK 1967  
Plan of Sarcophagi

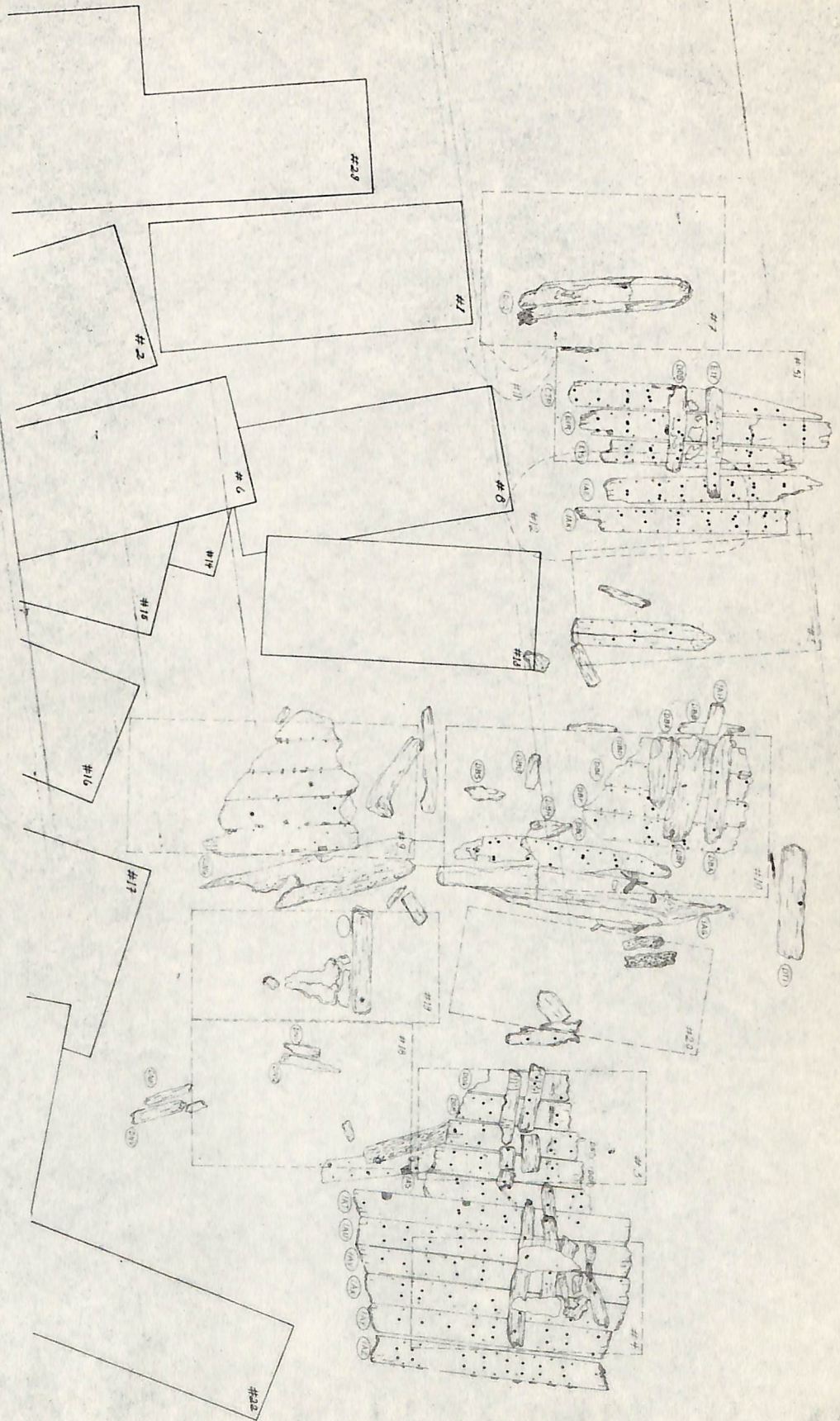
Drawn by: [illegible]





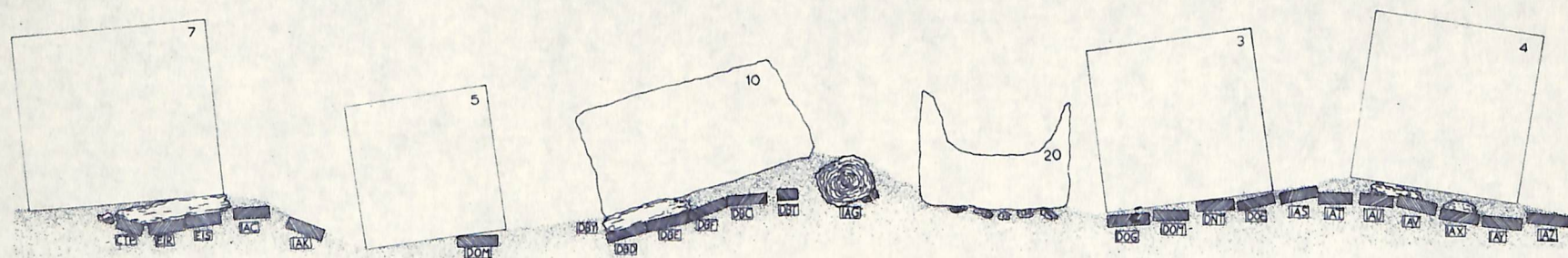
Torre Sgarrata Wreck 1968  
Plan of State of Excavation - End  
of 1967 Season  
W = Areas of Wood







PLAN OF WOOD ALONG NORTH END OF WRECK



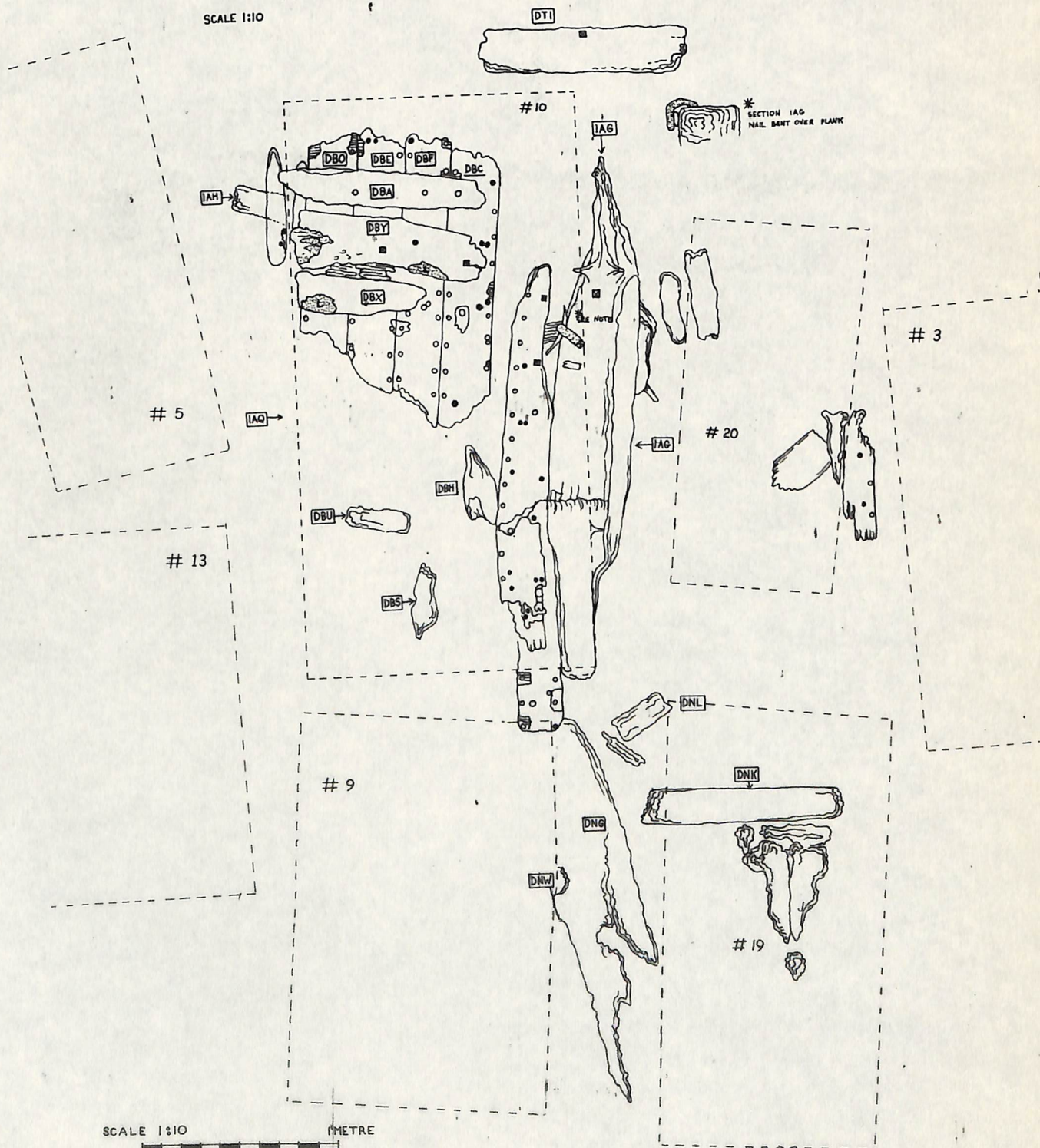


PLAN 2

TSG

## PLAN OF WOOD IN CENTRAL NORTHERN AREA

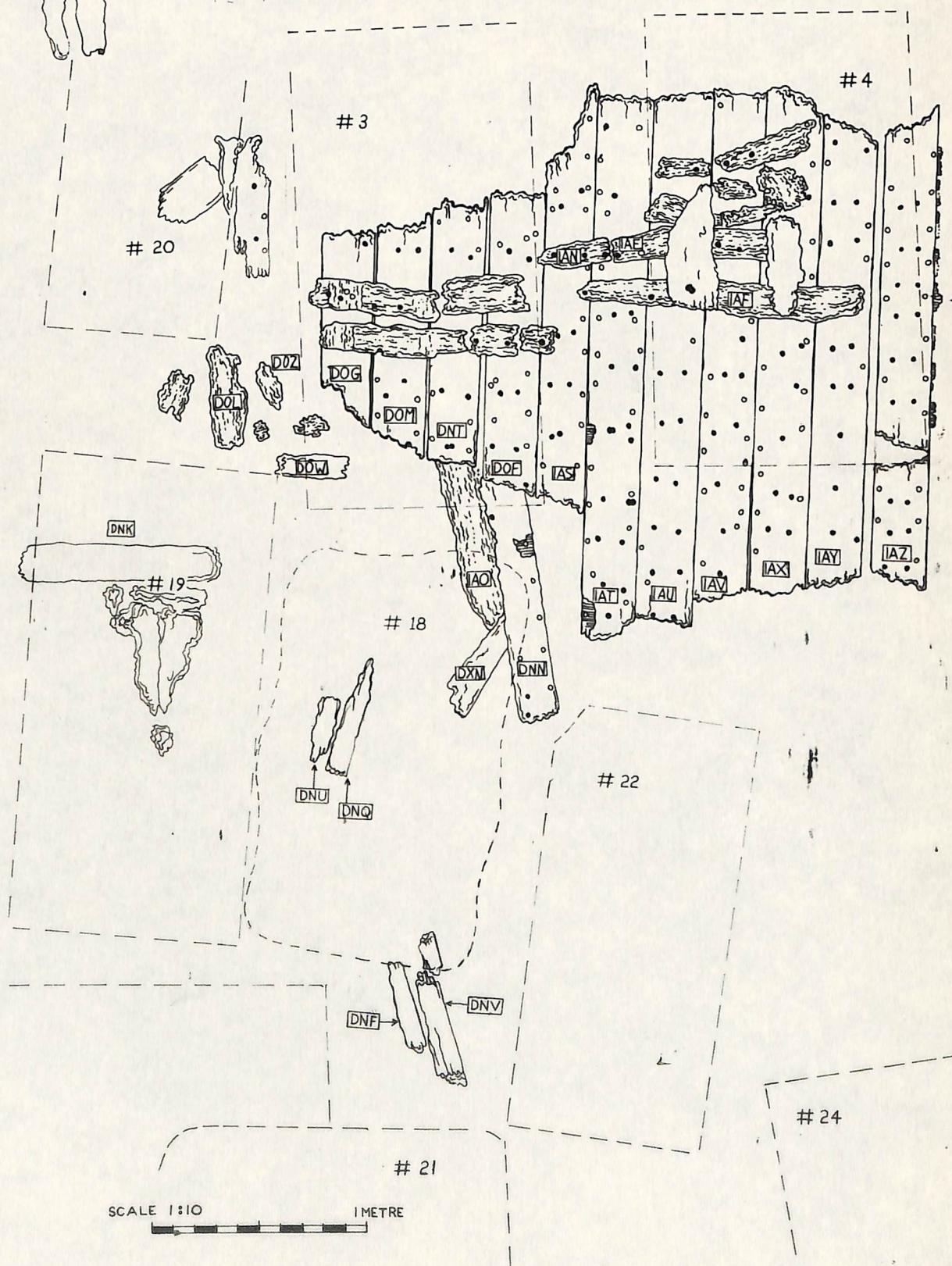
SCALE 1:10





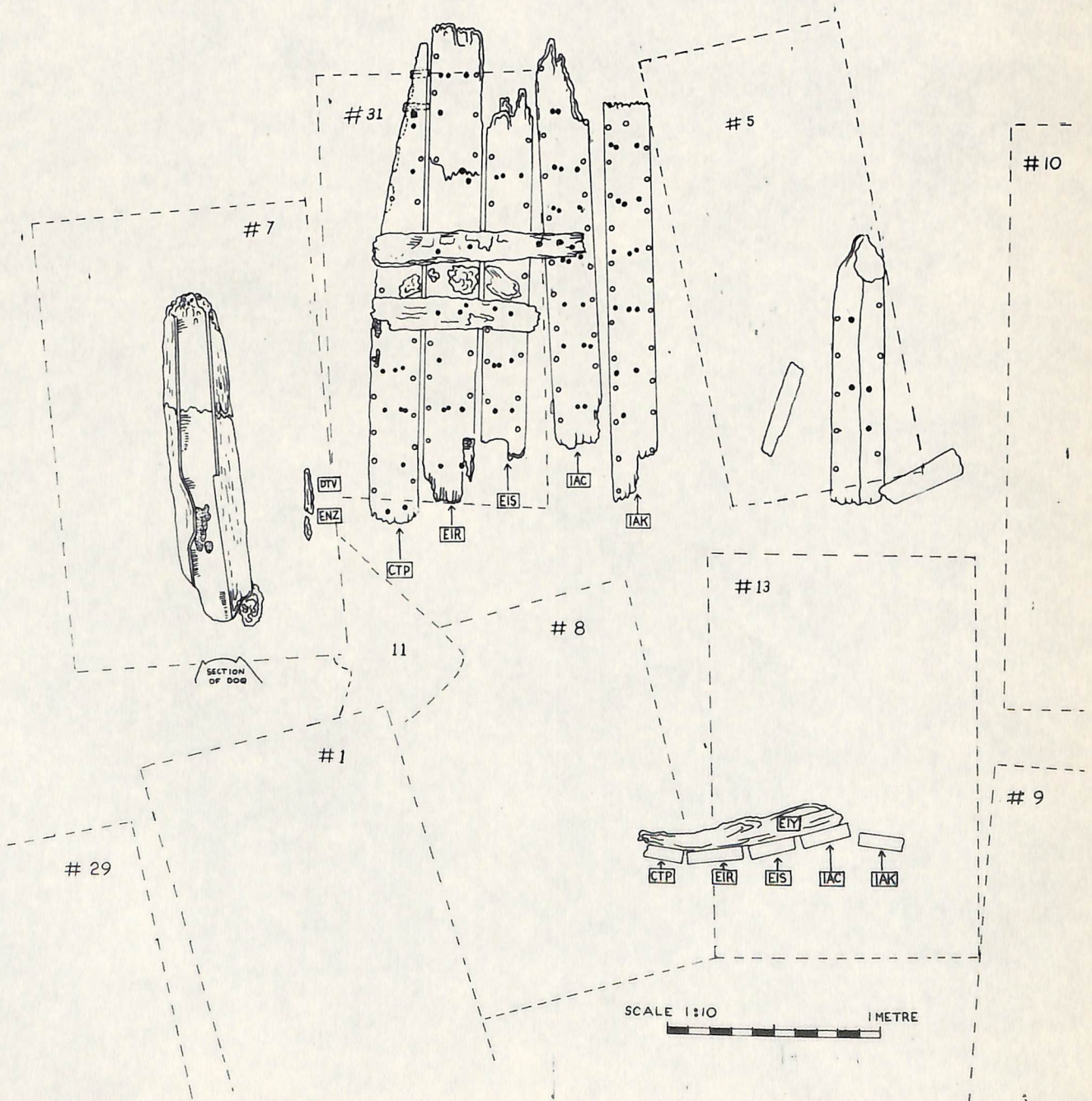
TSG

PLANTING 11-21-63 CORN





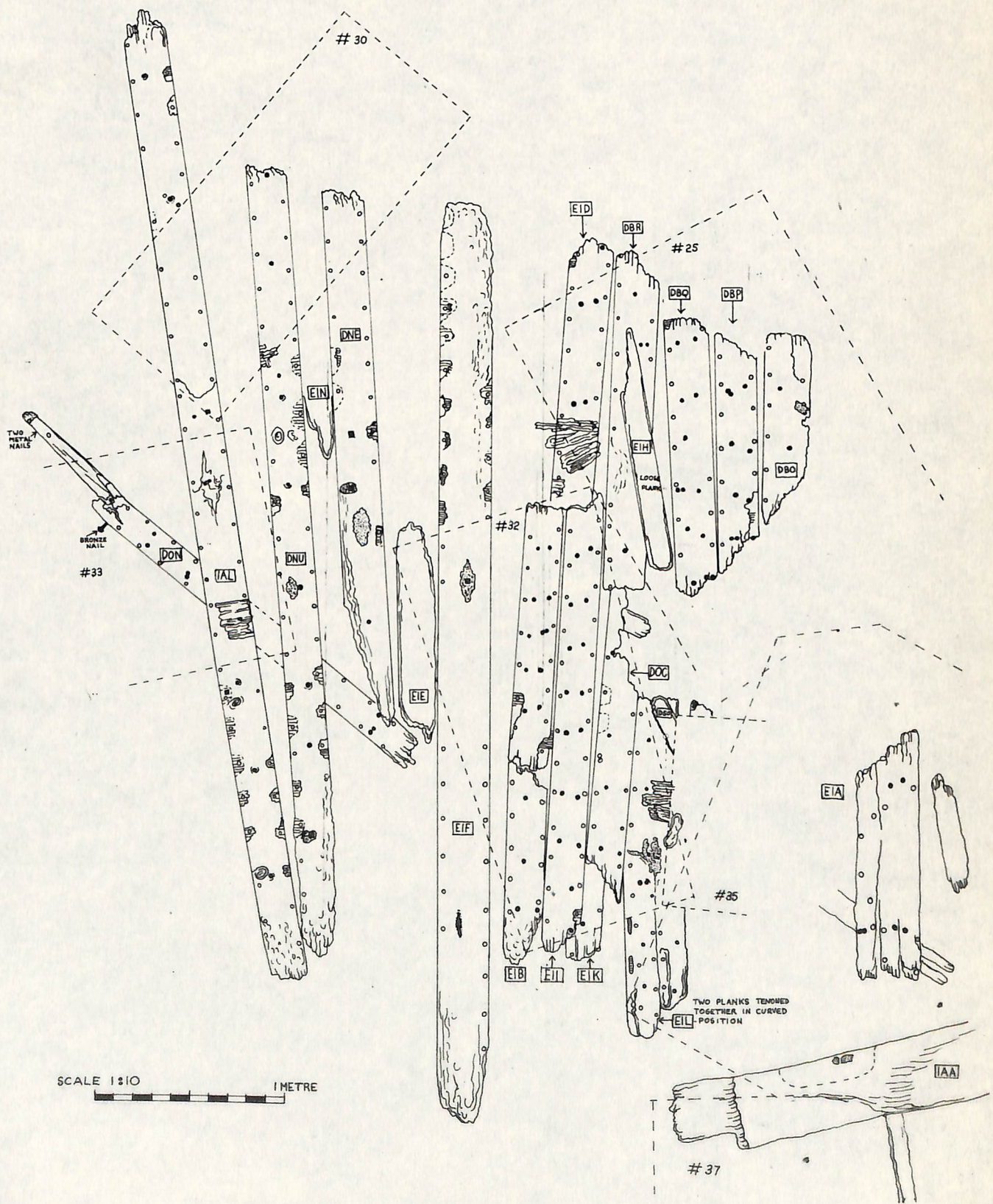
TSG





PLAN OF WOOD IN S-W CORNER

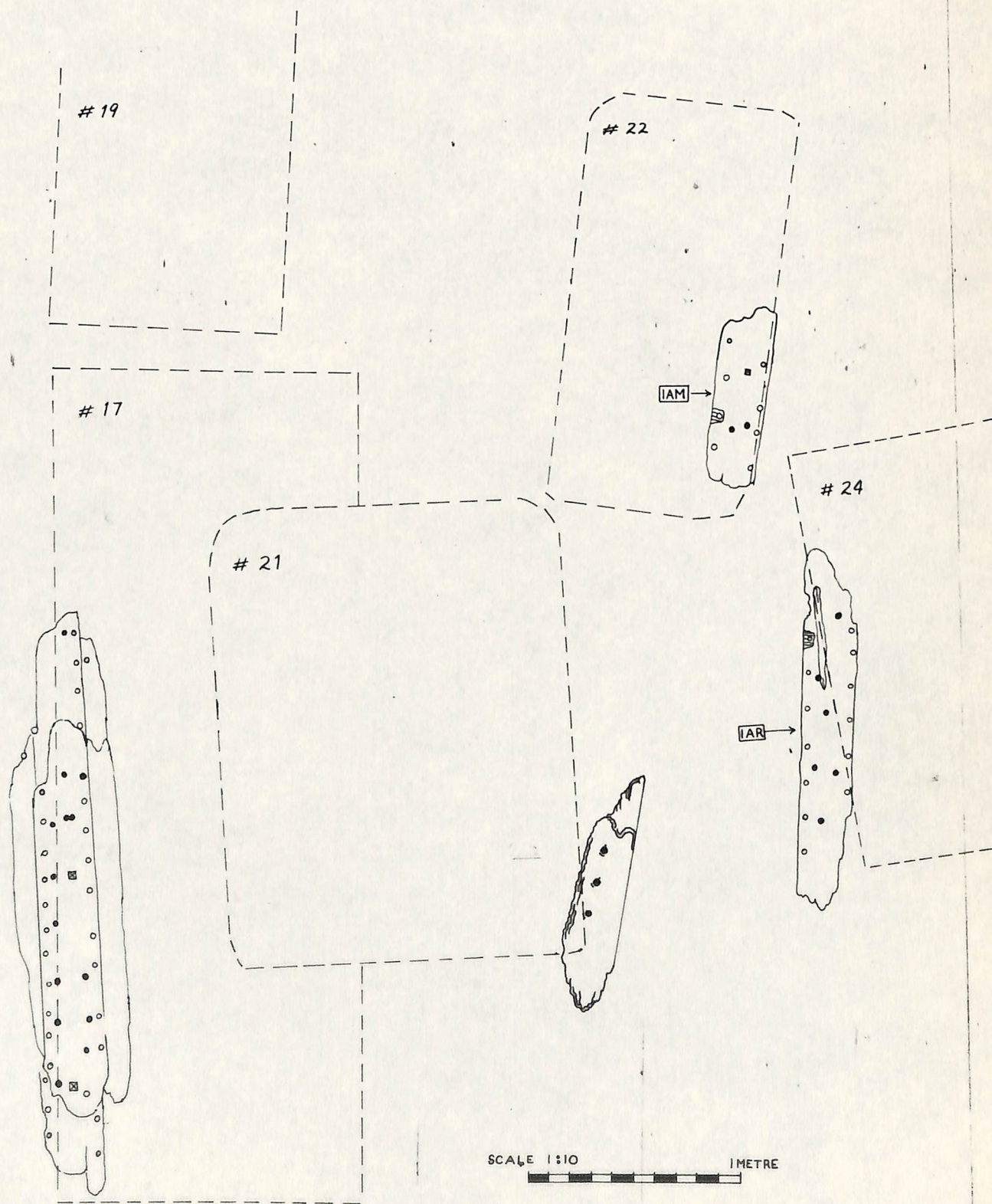
TSG



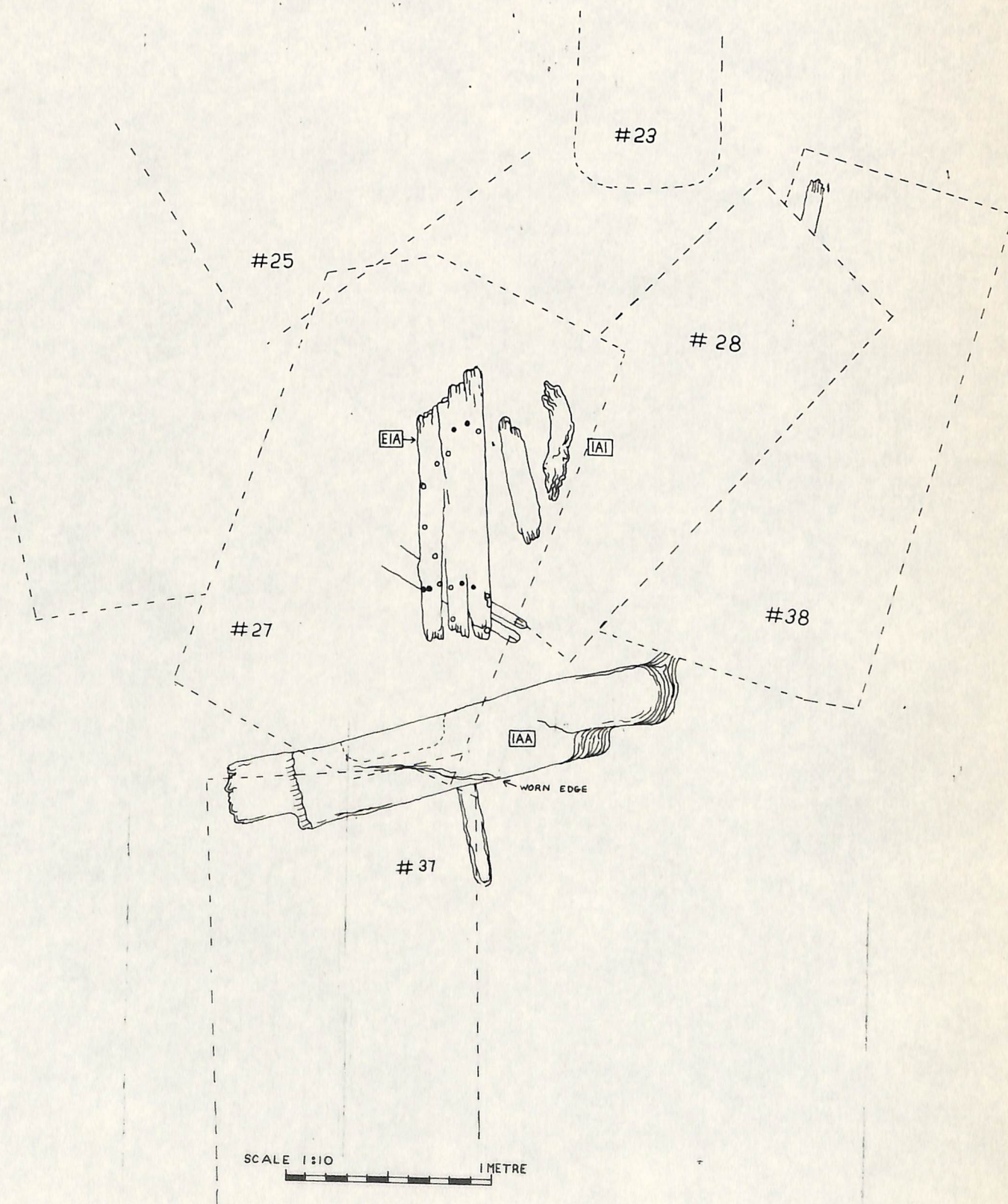


TSG

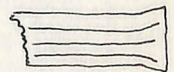
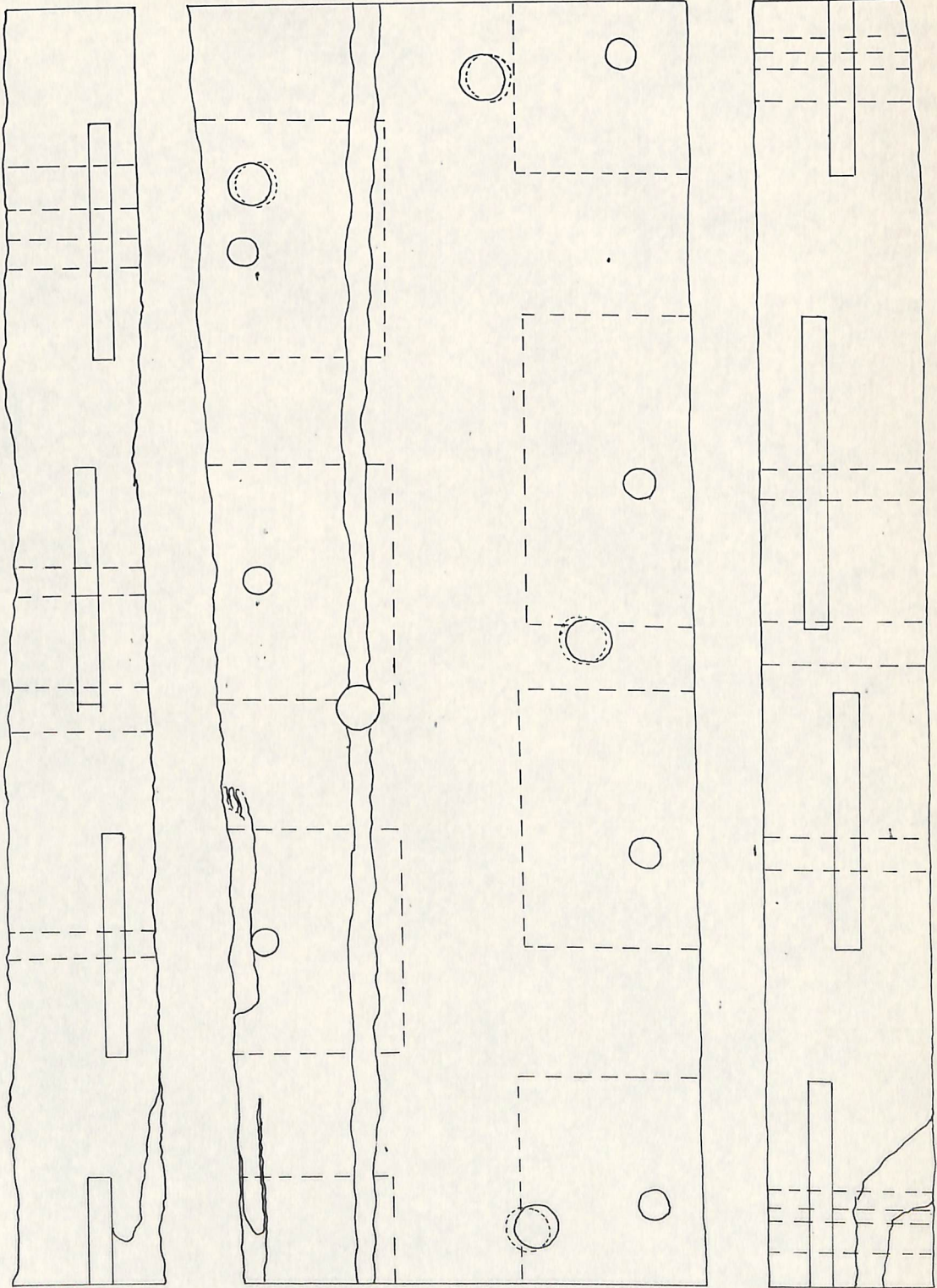
## PLAN OF WOOD BETWEEN SARCOPHAGUS 24 AND 21







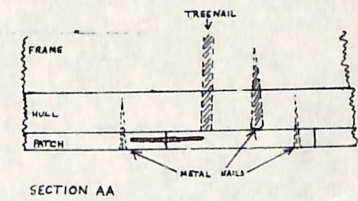
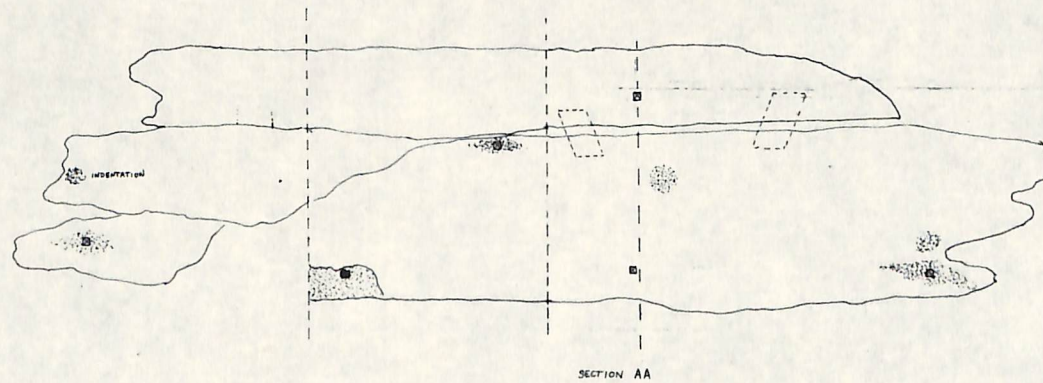






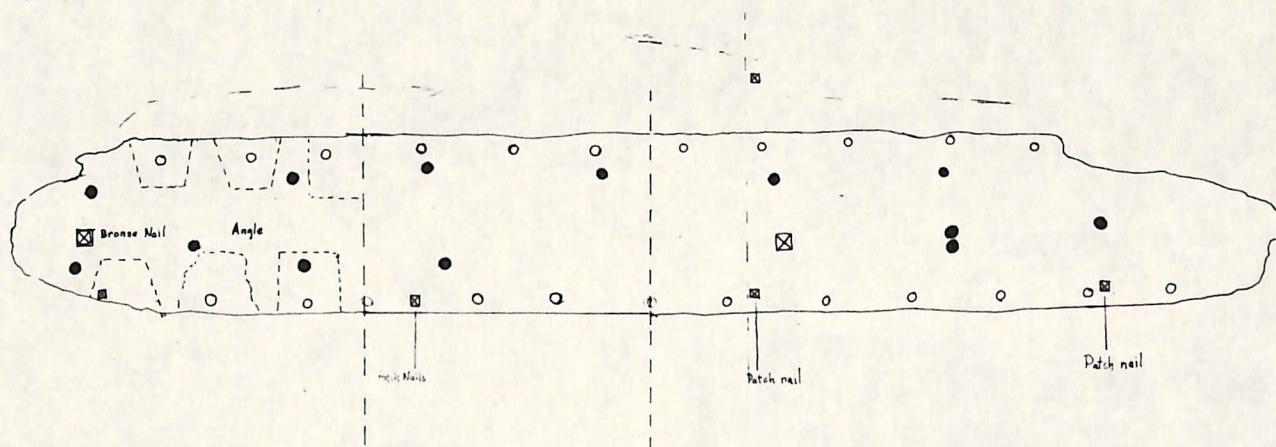
# PATCH

INDENTATION CAUSED  
BY METAL NAILS PENETRATING  
FROM UPPER PLANK

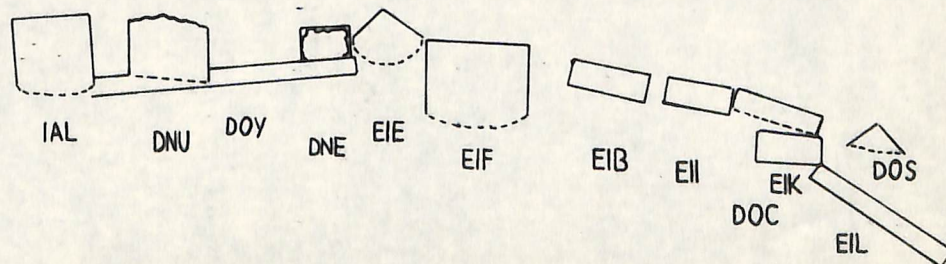
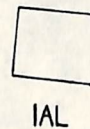
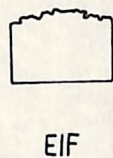
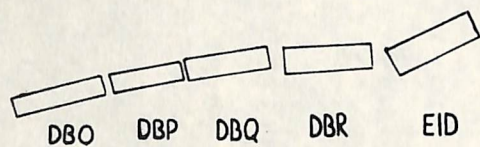




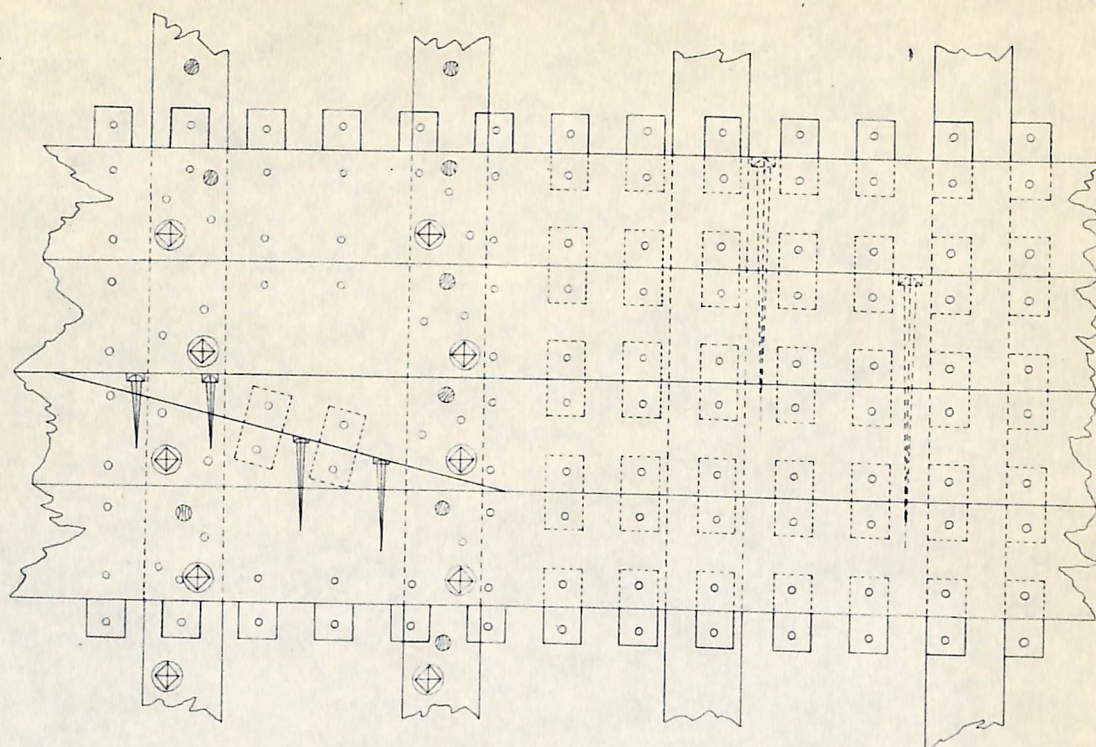
(TOP)  
Metal nails every 48-42 cm  
(every other frame)  
PLANK



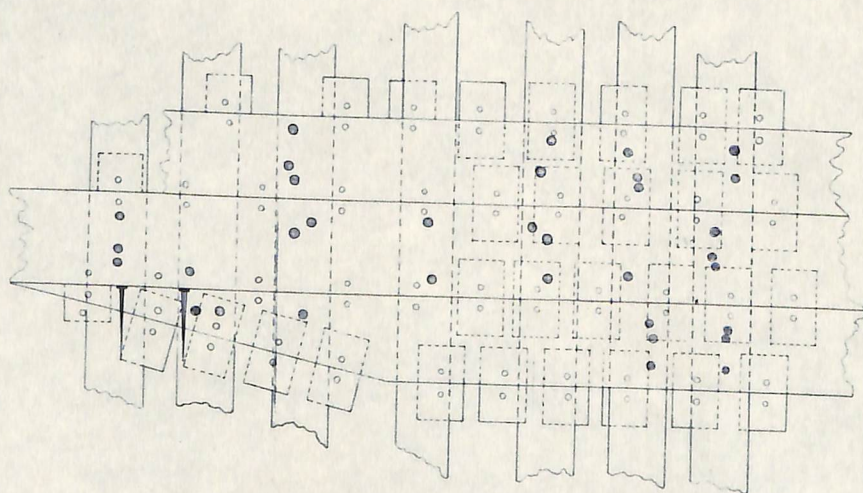
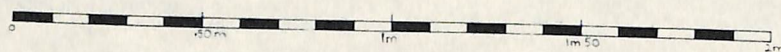




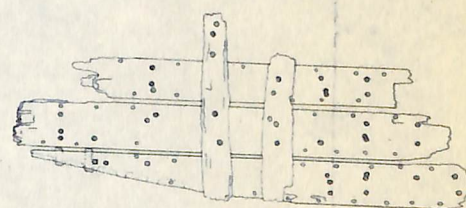




Planking from the Nemi ships, showing details of construction. (see G.Ucelli: *Le Navi di Nemi*, Roma 1950, fig.153.)



Reconstruction of planking from the Torre Sgaratta wreck.



Planking and frames as found.



WRECKS: TORRE SGARRATA

307