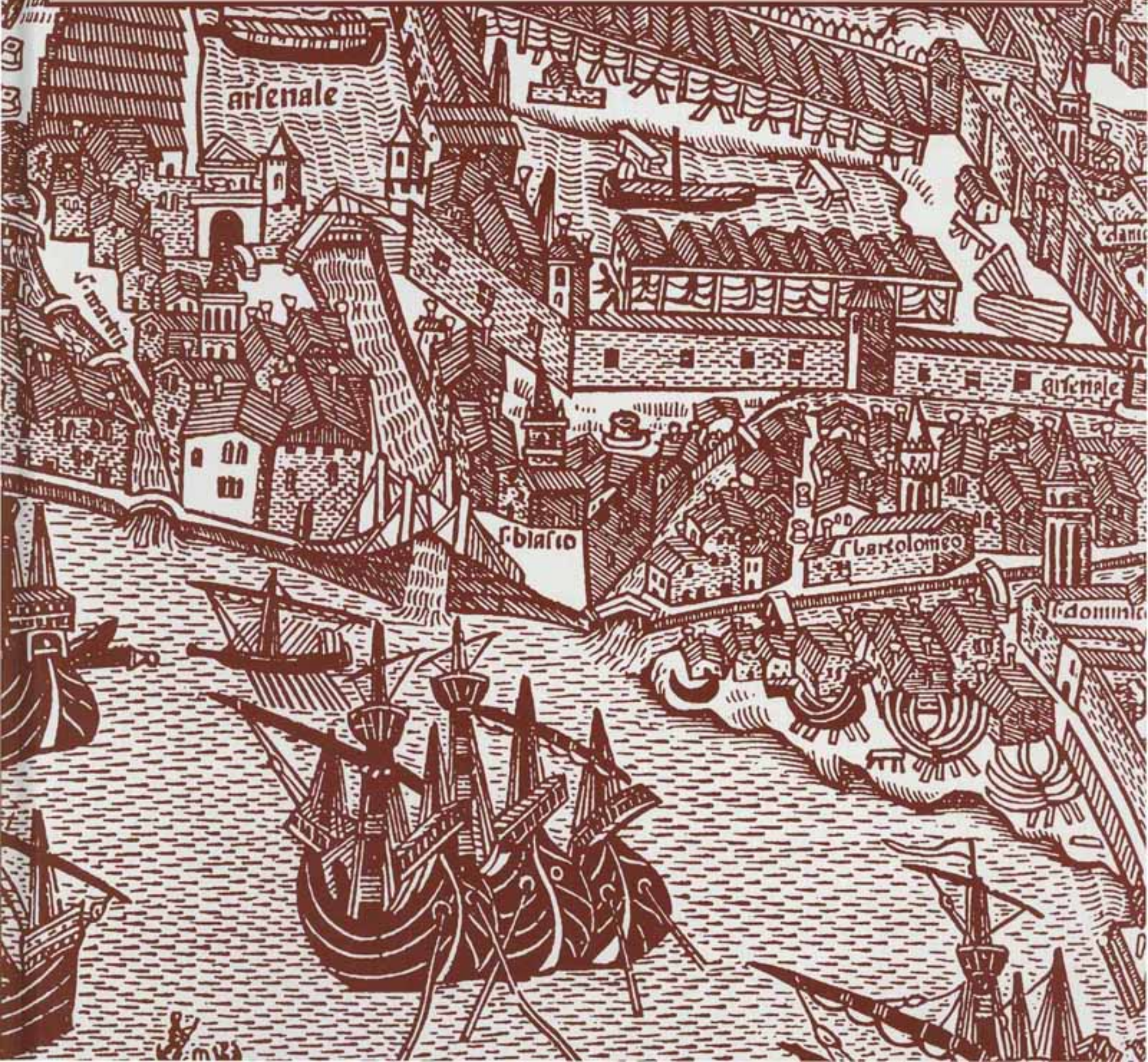


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51. A Comparison Between the Earliest Testimonies of Venetian Construction Techniques and those of the Present Day

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Introduction

Venice offers the naval researcher an unrivalled variety of vessels; hundreds of types of boats and ships have been passed down over the centuries and many of these are still used by this population of enthusiastic carpenters.

In our opinion this abundance of research-material has not been adequately studied. The history of Venetian naval architecture – like Italian history in general – has yet to be written. In Italy, little attention is paid to naval culture, and the few researchers who have dedicated themselves to the subject – none of them professionals – work independently of each other. This means that there is no precise way of comparing the results of their studies – a comparison that would either stimulate further research or would rapidly settle differing opinions and establish fixed points of reference. Above all, this research is, in our opinion, compromised by the fact that it is detached from the world of boatbuilding and sailing.

To avoid making the same errors, we decided to conduct our research using a lengthier approach, but one which we feel has more scientific validity. We began by collecting and classifying all the material relating to the subject and, for the moment, resisting the (strong) temptation to apply theories of our own to the evolution of Venetian boats and ships or to their traditional construction methods.

Our task was to separate the opinions of historians, ourselves included, from the historical sources. The *Archive of Sources for Italian Naval History* which we are creating will, we hope, be a common and verifiable base from which we and other researchers will be able to draw information.

Naturally such a vast and unexplored field of research posed an urgent problem of priorities: the work of the historian is often first and foremost a work of preserving memories. Therefore we set aside the written documents, which could wait, in order to dedicate our energies to the ethnographic world which is disappearing (Fig. 51.1).

The surviving boatbuilders who use, or used, the traditional methods are all in their eighties; they have no

apprentices and the small number of their sons who continue the family's traditional work admit that they do not know how to construct the boats built by their fathers. When the old boatbuilders have died, the loss of accumulated experience will be similar to the burning down of an archive.

We began by collecting and classifying historical evidence directly from the boatbuilders, fishermen, sailors, sail-makers, rope-makers and anyone involved in marine activity. Whenever possible the evidence was also recorded on audiotape to preserve the local pronunciation. Particular attention was paid to the collection of *sesti* and *sagome* (templates) from Venetian boatyards. When it was not possible to acquire them physically full-size drawings were made (Fig. 51.2).

To learn the traditional construction techniques without preconceptions, we had to set aside our scholastic background and enter the boatyards not as experts, but as apprentices. From the accounts of the protagonists and the teachings of the *maestri d'ascia* (master boatbuilders), the history of Venetian boatbuilding comes over as a rich and complex world, apparently conservative, but full of suddenly rejected techniques and innovative ways of accelerating the construction process; a world in which ancient boats which have remained unchanged coexist alongside continual variations or innovations. No ship or boatbuilder (or client) can resist the temptation to try to improve the performance of a vessel while it is under construction. Transformations came about as a function of changes of route, traffic, armaments, fishing techniques, the sea bed, and – why not? – changing aesthetic taste.

The other important source is the *corpus* of manuscripts of naval techniques which the shipbuilders of the Venetian *Arsenale* have left us: notebooks in which information relating to the construction of a large number of ships is transcribed in detail. These precious texts are difficult to interpret because they are written in a mixture of ancient Venetian dialect and shipbuilders' slang, and because they



Fig. 51.1 An image of Penzo family's boatyard in Chioggia: the launching of two seagoing bragossi.



Fig. 51.2 The boatbuilder Schiavon during the survey of the templates used in his boatyard.

take for granted the reader's familiarity with the construction techniques they describe.

As well as these texts we have discovered a large number of notebooks written by private builders at the beginning of the twentieth century that, surprisingly, give the same amount of information and use the same language as their fellow boatbuilders used six centuries before. A facsimile edition of the first volume of this series, the *Libro de rason* by Prè Theodoro de Nicolò, kept in the Marciana National Library of Venice, is due to be published shortly.

The information in these manuscripts gave us a better understanding of some construction methods referred to by the builders and, conversely, the builders' explanations helped to clarify a number of obscure stages described in the manuscripts.

Other important sources of information are the technical drawings, models, and the boats themselves. All the drawings of ancient ships and boats which we were able to consult have already been published, but it should be remembered that 'naval drawing' as the term is

understood today, is a relatively recent invention. All the ships and boats, whatever their size, were always made (and are still made) with reference to *sesti* and *sagome*. The drawings which do exist can be classified in three categories: surveys taken after construction; drawings used for bureaucratic purposes; and drawings to show the client how the final product would appear. Rather than using drawings to define the design of a vessel, models (such as those of the *Arsenale*) were used so that the *proto* (foreman) could check the progress of the forms. These models are being catalogued in the same way as the drawings.

We will conclude our examination of the sources with the surveys of the boats. As well as recording the form of the boats, these surveys recorded the details, the construction methods and the marks left by tools. Naturally, whenever possible, we try to save these last examples of the historic boat for conservation by museums or private collectors. It should be pointed out here that the Italian government encourages their eradication since any fisherman who wants to build a new boat must destroy the equivalent tonnage of old boats in the presence of a state official (Fig. 51.3).

All data collected from each of these various sources were then interpolated so as to highlight the differences or agreements between them, and the words and phrases of the boatbuilders' terminology were compiled into a dictionary that will be published soon. It should be remembered that the same considerations which are valid for the Italian language can be applied to this 'marine terminology': it is not a single language but a combination of a number of dialects: Venetian, Ligurian, Neapolitan, Tuscan, languages which were then forced together in the official marine language devised after the unification of

Italy, a language in which many of the terms were invented and never used in practice.

The next steps were the drawing of the construction plans and the construction of models: firstly scientific models, secondly carpenter's models, and finally seaworthy replicas. Models and boats were then subjected to a thorough examination by the *squerarioli* (Venetian boatbuilders) who needed no persuading to point out the slightest defect. Any inconsistencies were then checked again with our interpretations of the sources (Fig. 51.4).

I apologise if I have spoken about this scientific approach to historical study for too long, but while the methodology is commonly used in the more informed centres abroad, in Italy it is being adopted with difficulty, because other less rigorous qualities are preferred such as imagination and improvisation.

Venetian Construction Techniques

From our integrated comparison between historical sources and the methods of contemporary craftsmen it emerges that before the end of the Second World War construction techniques did not undergo significant changes from earlier centuries, whether in small boats or large ships.

The techniques of design and construction, the means of transport and wood-cutting, the tools, the nomenclature and graphic symbols, the methods of bending the lengths of wood, the techniques of rowing, navigating and fishing, the painting and maintenance – all these have remained similar if not identical.

Many boatbuilders still use the ancient units of measurement, at least six centuries old, based on the *piede* (foot), its multiples *passéto* (small pace) and *passo* (pace) and on



Fig. 51.3 The hull of a bragosso that has just been destroyed for tonnage regulations.

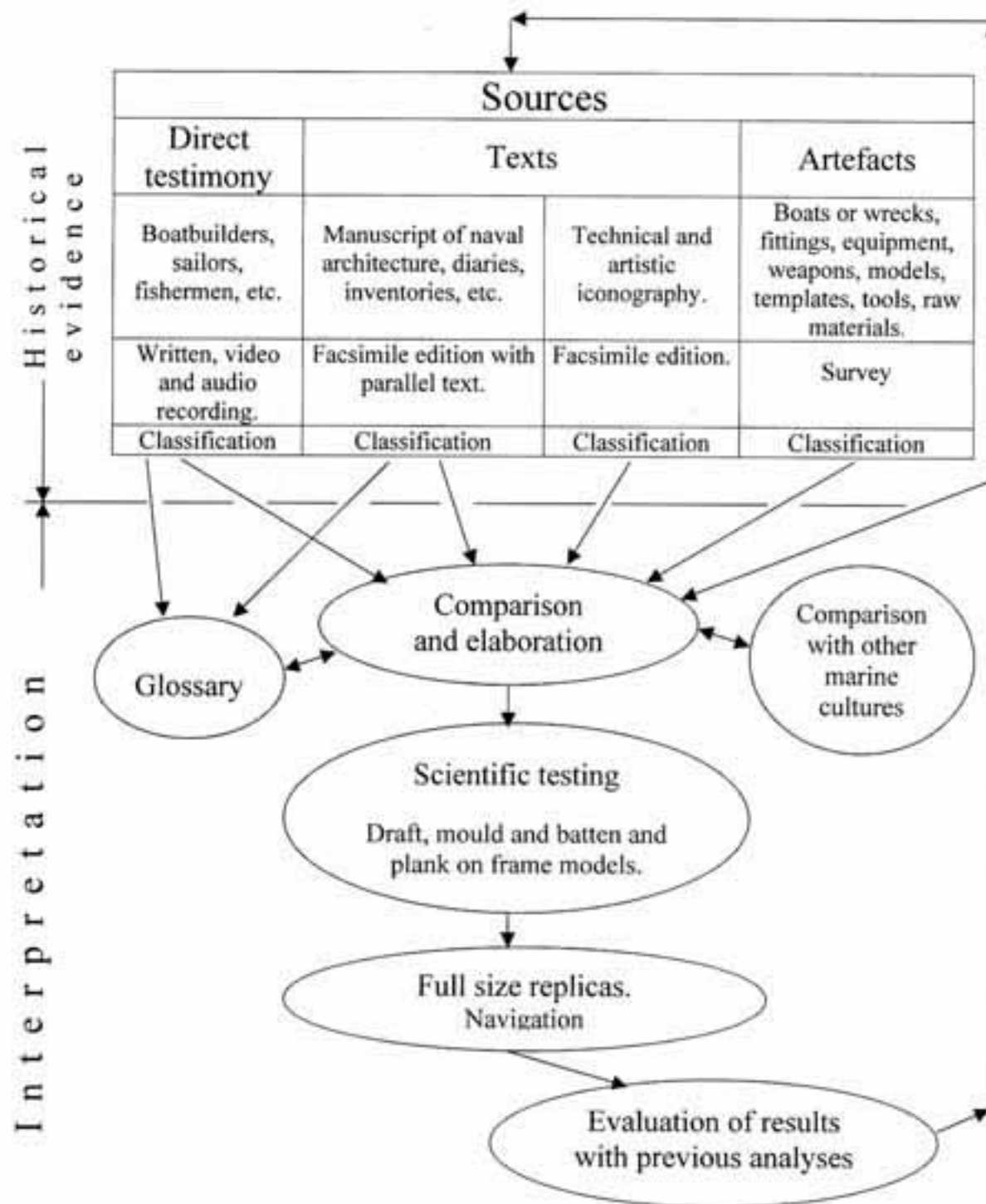


Fig. 51.4 Criteria of working methods used by the Centro Ricerche Navali.

a vast number of divisions such as the *palmo* (span, palm), the *quarta*, the *ónsa*, the *deo* (finger) the *linea* (line) and the *canna* (rod). They have kept these units for certain formats of timber or for reference measurements even after conforming to the metric system; converting these measurements to metres and centimetres would involve long strings of decimal places which would be difficult to memorise.

The boatbuilders continue to use their special graphic symbols to indicate the principal parts of the boat: midships, the stern, the bow, and the conspicuous points known as *posélesi* (Fig. 51.5). They use, or remember the use of the various methods of dividing a segment progressively employing either *moreli* (two short sticks) and a triangle, or the semicircle method.

Other signs are still used when surveying the unbent length of the strakes by means of a *cantinela* (batten) and a stick soaked in red powder contained in the small solid wood box called the *cassela d'ambuoro* (Figs. 51.6, 51.7).

Traditional naval construction uses carvel build on a

supporting skeleton, based essentially on the direct design of the hull modelled in thin wooden templates called *sagome* which are used to trace the outline of the wood being worked. Some of these *sagome* called *sesti* allow, by means of a system of movements guided by special signs, the tracing of a series of shapes which gradually differ in relation to the others, as in the case of the sections (Fig. 51.8).

The boatbuilder always begins from the *cantièr*, the slightly upward-curving plank that will support the entire boat whether it has a keel or is flat-bottomed. At either end of the *cantièr* the two sticks modelled with the respective templates are positioned at the correct angle. Then once the *cantièr* has been subdivided into the required number of sections, the midship section and the two end sections are fixed.

The points positioned at the end of the sticks on the three principal sections, or *cai de sestu*, form a fixed path which the *sercio* or *magèr de bóca* must follow to avoid depressions or irregularities. This way a very small amount

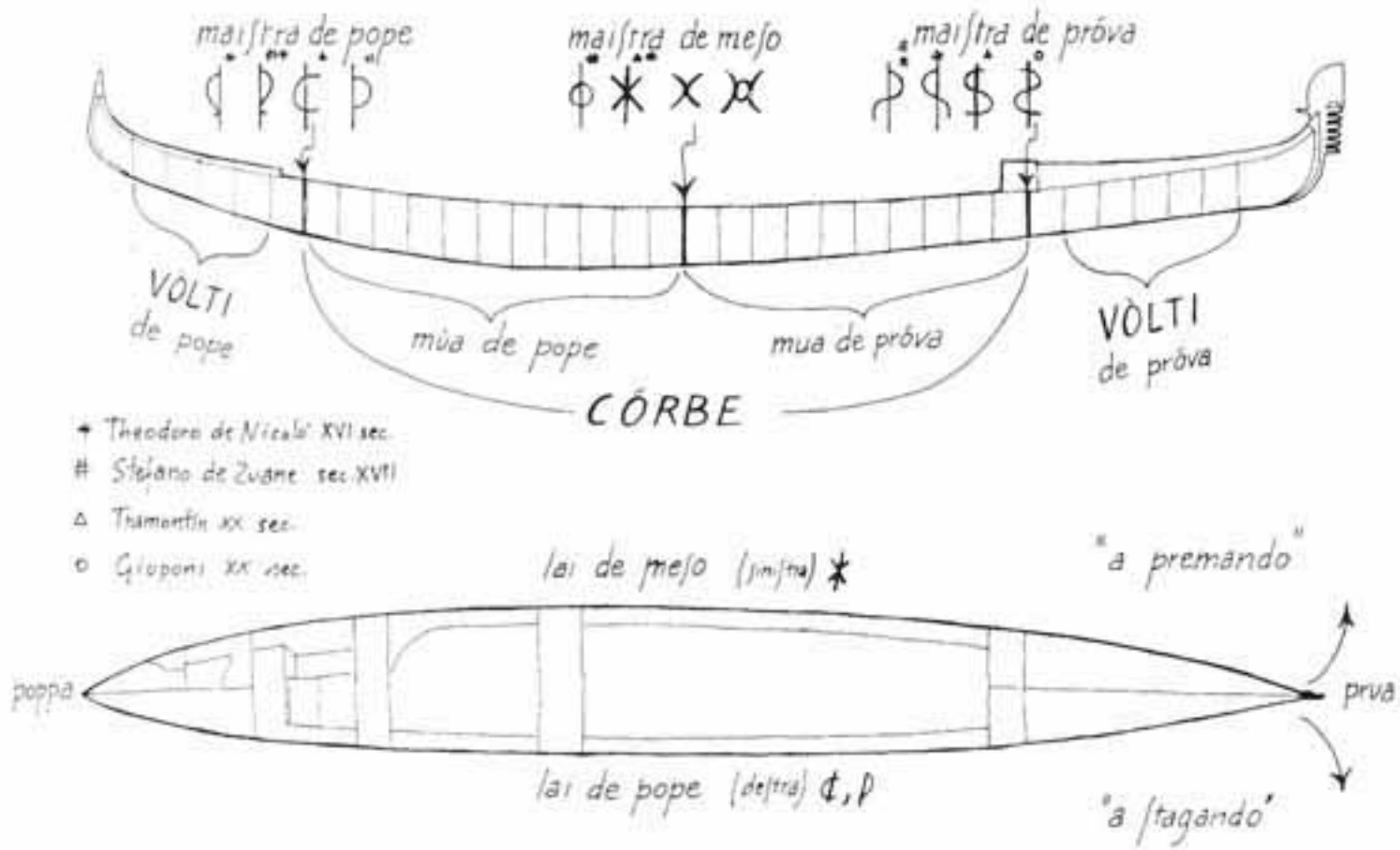


Fig. 51.5 Graphic symbols used by the boatbuilders to indicate the stern, bow and midship, the posésesi and the nomenclature of the sections.

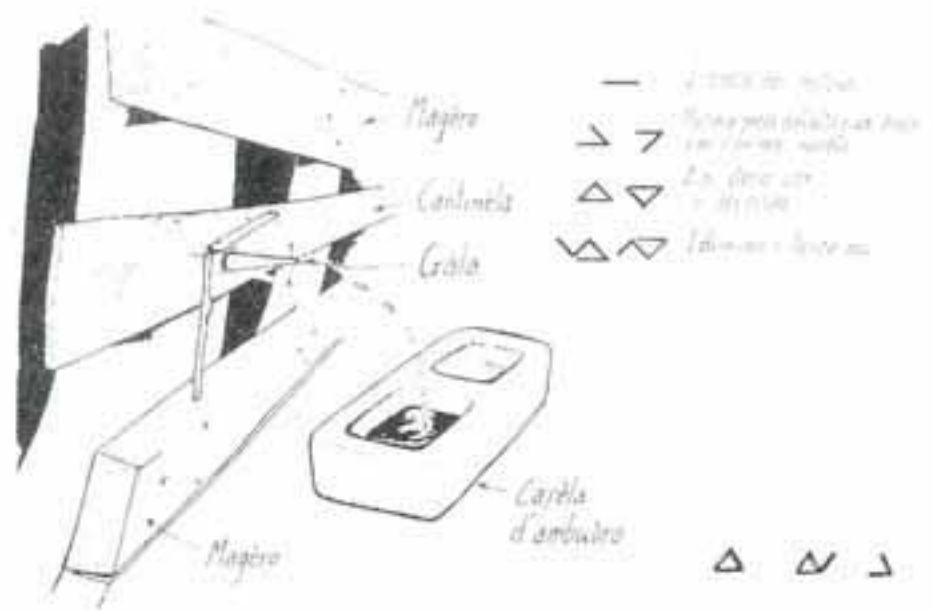


Fig. 51.6, 51.7 Method used to survey the shape of a strake, and the relative set of symbols.

of information needs to be remembered to record the form of each boat. It is interesting to note that in the case of the *sesti* (so precise that they are used to trace all the sections), the *squerarioli* continue to fix the three master sections and the first band of planking before inserting the other sections (Fig. 51.9).

Traditional Venetian construction, in common with that of every other country, is based to a large extent on working *A ocio* (by eye/by rule of thumb) which is often erroneously taken to mean 'at random' or 'lacking precision', when it actually means 'guided by my eye', a guide which can be very precise when precision is called for, as demonstrated by the lines traced on the *sesti*

separated by steps of less than a millimetre. The traditional boatbuilder does not apply the same rigid tolerances to the entire vessel; he knows when to be precise and when to compromise. We should bear in mind that a boat is not an abstract entity, but a real artefact made with wood, and having all the imperfections intrinsic to the material. If a block of wood had an imperfection, it was not thrown away; rather the profile of the piece was retouched or the potentially fragile part was positioned at a point not subjected to stresses. The whole thing resembled – if you will forgive the daring comparison – a sculpture by Michelangelo where smoothed surfaces alternated with areas that were deliberately left without finish, where the

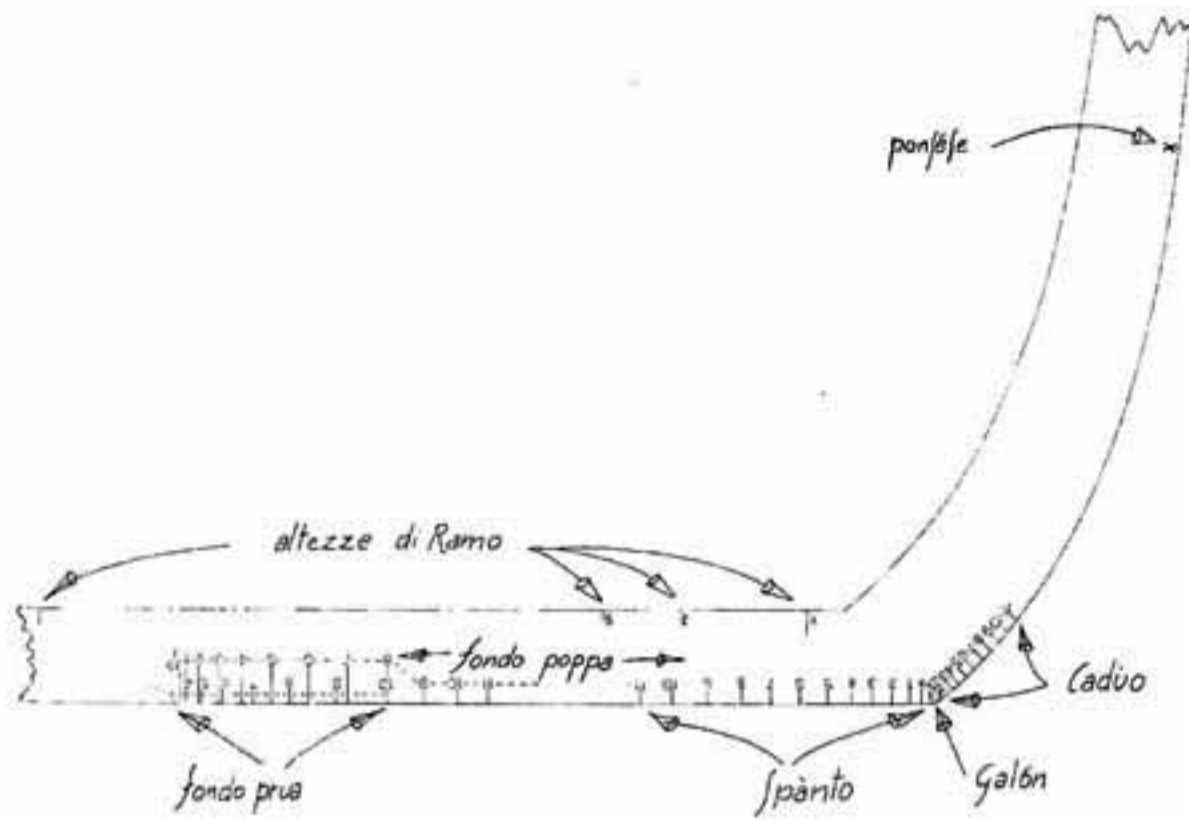


Fig. 51.8 Templates for a gondola, and traditional nomenclature.

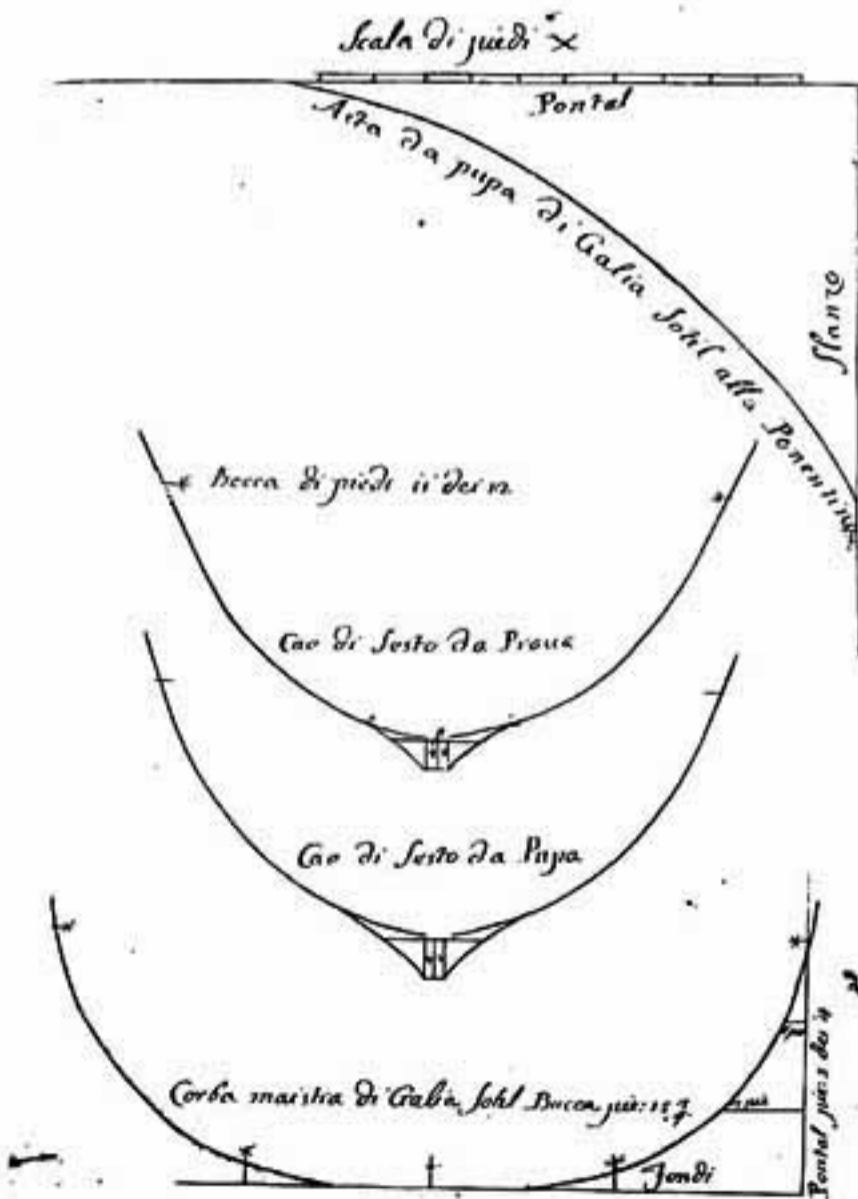


Fig. 51.9 Drawings of the three principal sections corba maistra and cai di sesto are also included in the page of the manuscript by Stefano de Zuane dedicated to Galia sotil alla ponentina.

tool-marks can be seen. This result was virile and expressive: an effect that reconstructions of historic boats do not often have, as they are made entirely by machine – with clean edges which give the idea of something dry and artificial.

It should be stressed that the boatbuilders were intransigent not only as to the form of the boat, but also over details which we would define as aesthetic or of secondary importance; no boatbuilder would have neglected to finish a *mancolo* (mooring bitt) or a *zogia* (garland) according to the rigid traditional criteria. Thus the same boat could have parts which were brutally rough cut in areas normally out of view, but also elaborate decorations on its edges, on the wale or on the bulwark

A Comparison Between Two Manuscripts

To bring out the similarities between the ancient and contemporary boatbuilders, we will compare two manuscripts: one from the mid-sixteenth century (Fig. 51.10) and one from 1920 (Fig. 51.11); two worlds chronologically and spatially distant from each other. One belongs to the *Arsenale*, the other to a small private boatyard of one of the islands of the lagoon. The pages we have selected refer to a large warship, the other to a small fishing boat. As can be seen, a small page of manuscript is sufficient to contain all the information considered important, the rest – omitted – was part of the individual know-how passed from father to son.

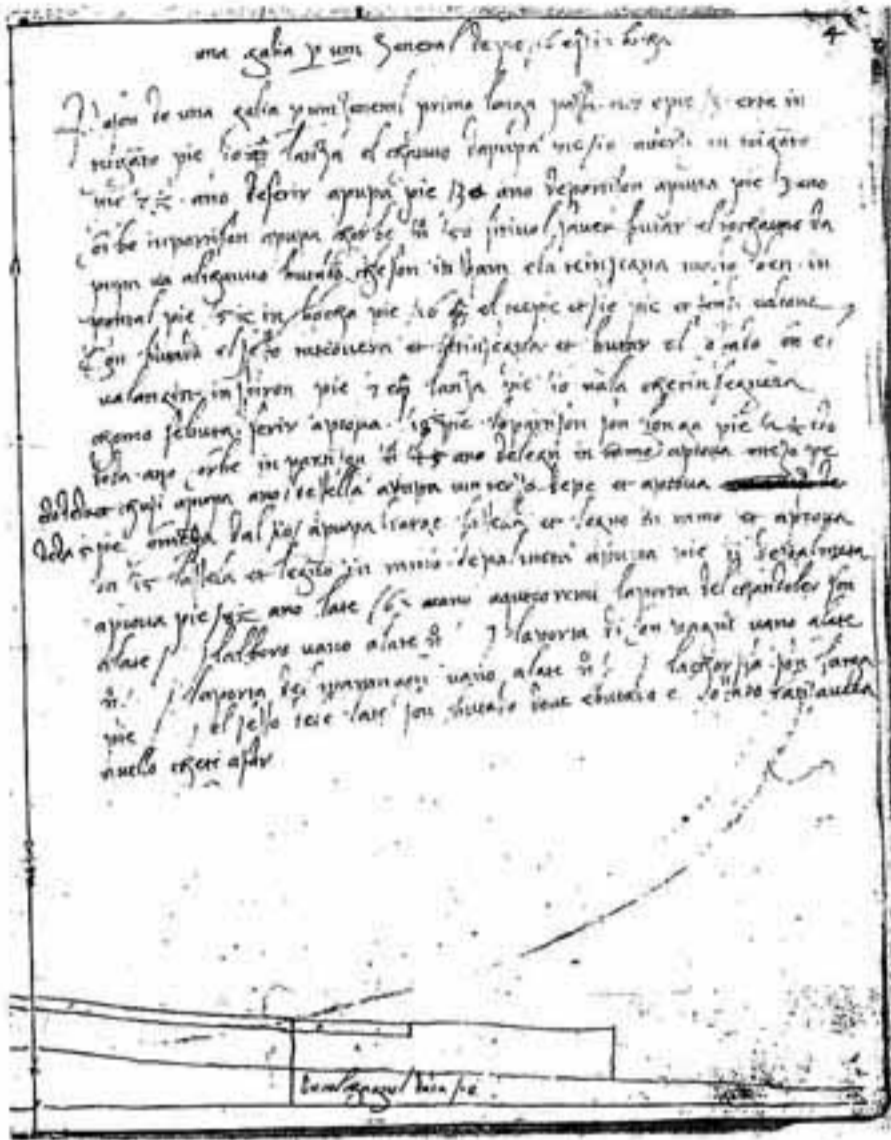


Fig. 51.10 Libro de rason by Pre' Todaro de Nicolò, instructions for building a Galia per un zeneral (Galley for a general).

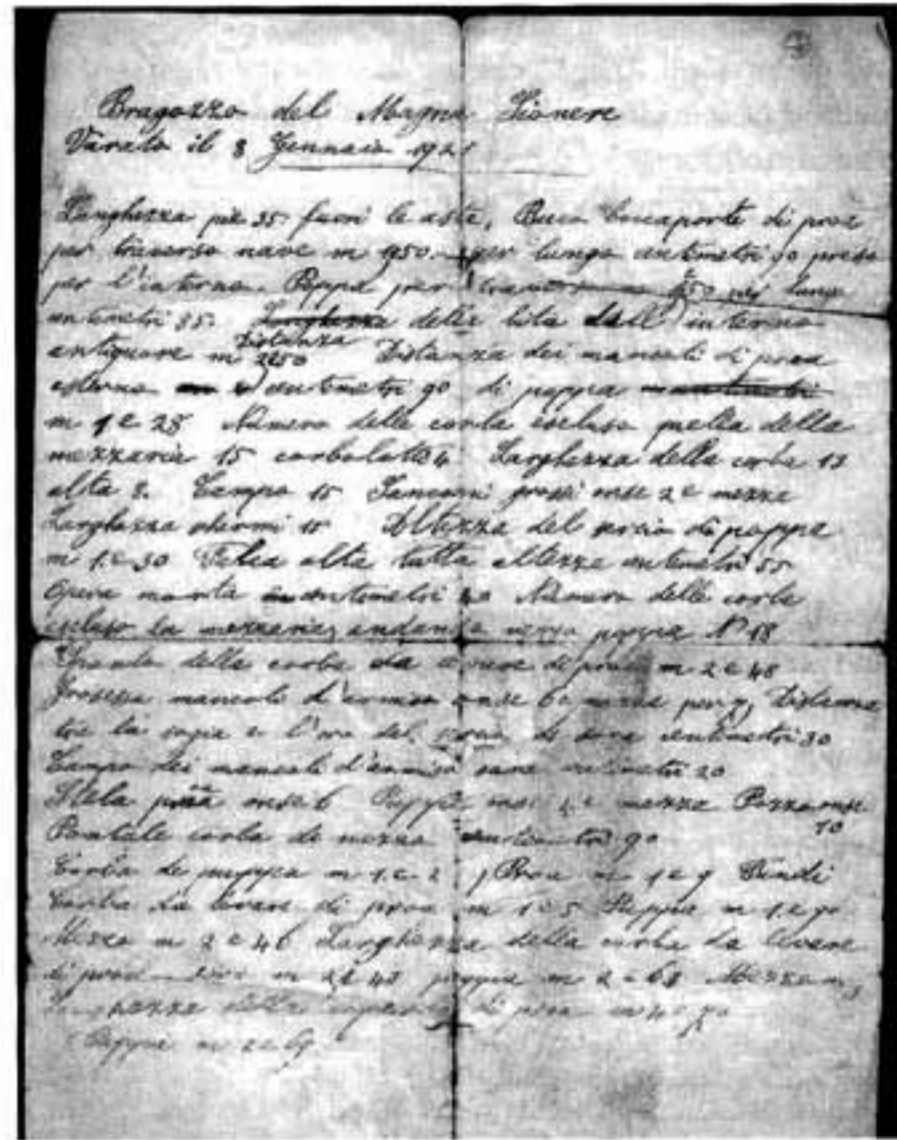


Fig. 51.11 Manuscript by Aristide Bertotto, notes for building a bragozzo.

The most important instructions are always the same: memorise with the smallest amount of data the three-dimensional form of the vessel. To do this, as mentioned previously, only the three sections corresponding with the middle and the two extremities of the hull (called *corbe maïstre* or *da levare*) and the geometrical methods of reduction *schorere de sesto* are recorded.

Note that the authors of these and other manuscripts give great importance only to the *sagome* and *sesti*, and drew them with great precision while omitting the drawing of the ship as a whole: and if they did draw the ship, the drawing was so naive and lacking in detail that it was merely an *aide-mémoire*. The terminology is particularly interesting: every part of the ship, every tool, every phase of the construction process had – and still has – a specific name. Examples of the many still in use are: *cantier*, *cao*, *slânso*, *colómba*, *stéla maïstre*, *córbe*, *piàne*, *bóca*, *pontàl*, *calcagnio*, *sumi*, *magèri*, *caéne* (these are just a few of the terms relating to the skeleton). To avoid misunderstandings and to accelerate the execution of the sections, even the most humble pieces of wood or other components, such as nails, had a specific name. All of these terms, which are not found in the usual marine vocabulary, were used not only by Venetian boatbuilders: through military and commercial cooperation they made up a real

lingua franca spoken in many Mediterranean lands.

There are also similarities in the way the vessels were defined: alongside the technical name the boatbuilder wrote the name of the client. This demonstrates that they did not build standard models, but adapted the basic form – often with minimal changes – to match the requirements of the shipowner or captain. While Todaro de Nicolò writes: ‘Rules Relating to the Construction of the Frigate made for Signor Gierolemo Contarini, a captain based in Cyprus’, Bertotto writes much humbler annotations: ‘*Bragozzo* made for the *Magna Sionere* (the one who eats waterspouts) Launched on 8th January 1921’, or ‘My Godfather Toni’s *Bragagna*’.

In conclusion, it can be said that the traditional Venetian construction methods are still valid for vessels of small and large tonnage, and that the methodology used, based on continual modifications dictated by experience gained from previous construction, is a method that is in its own way scientific. It can be compared with the way captains navigated without the use of dead reckoning or charts – not because they did not know how to use them, but because in a sea of limited dimensions, with shallow waters and labyrinths of tiny islands, it was safer to navigate by instinct than to rely on primitive compasses and charts.

The empirical techniques employed by traditional

boatbuilders have a dignity which deserves to be recognised and understood. 'High' culture has always relegated this method of working to the fringes of knowledge in which legend, folklore and superstition are mixed together. But it should be remembered that the etymology of the word 'empirical' bears little relation to the negative meaning of 'hit and miss' with which it is now commonly used; an 'empirical' method is a method 'based on experience, on what can be proved by experiment'.

References

I would like to cite as sources not the usual publications, but teaching given me by others through their voices and gestures, as well as their boatbuilders' templates and memo booklets, at the same time begging forgiveness from those who have taught me, but whom I have inadvertently forgotten to mention here. This is not, then, strictly a bibliography, but is rather an "anthropography":

IN VENICE:

Angelo Marella, Nedis and Roberto Tramontin, Gastone Nardo, Giovanni Giuponi, Roberto dei Rossi, Gianfranco ("Crea")

Vianello, Mario and Marco ("Botte") Vianello, Duilio Cavalier, Giampaolo Proto, Daniele Bonaldo, and Aristide Battistin. The shipyards Cucchin, Cucco, Casal, and Celli.

IN BURANO:

Antonio, Piero and Guido Amadi; Agostino Amadi; Vittorio Amadi, Nerio Molin, Rino Molin, and the Bovo brothers.

IN CHIOGGIA:

My family Bullo ("Niere"), beginning with my great-grandfather, *parón* Giovanni, his sons Lionello ("Nello"), Angelo, Luigi, and Giuseppe; Aristide and Gino Bertotto, the family Cimolin, Bullo Antonio and Carlo, Olindo Ranzato, the family Poli.

IN MURANO:

The family Astolfo; the shipyard "Pericle."

In Pellestrina and Portosecco:

Attilio and Giovanni Schiavon; Pompilio Menetto, Piero Menetto; the heirs of the ("Detto") Schiavon.

Outside the Venetian Lagoon:

Dino and Luigi Rondolini, of Pesaro, Italy.

Other valuable sources of information: Silvano Voltolina, Paolo Bonaldo, Sambo ("Nino") Violante.