WEST - EAST OR EAST - WEST? REFLECTIONS ON THE ELUSIVE ORIGINS OF METALLURGY

by

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Summary

Several typical scenarios with respect to the origins and diffusion of metallurgy are presented and discussed, with the provisional conclusion that we are not yet, because of insufficient evidence, in a position to pronounce with certainty on this important but also difficult problem. For the time being we should concentrate on urgently needed additional research in this field.

ONE OF THE most interesting, and most challenging, sub-problems of the vast field of cultural diffusion is certainly the question of the probable origins of metallurgy. It has been discussed, since the beginnings of modern scholarly debate, in a remarkably controversial manner.

Mainstream opinion, dispute about center of diffusion, chronological problems

The usually publicized mainstream opinion, during the second half of the 20th century, has been that metallurgy had had ist origin somewhere in the Near East, among the early cultures there, e.g. in Anatolia or in the proto-Sumerian Ubaid culture (1). Clark for instance says about Ubaid: "Another sign of their relative advance over predecessors in Mesopotamia was that they practised metallurgy" (2), and about Anatolia: "The metallurgical treatment of copper ores and the casting of metal in moulds for the production od weapons and implements did not come until the fifth millennium; and the production of standard bronze based on the addition of tin alloy did not begin until c. 3000 BC and then only in favoured localities" (3). Piggott (4), speaking of an (of course hypothetical) "undivided Indo-Eiropean homeland in the third millennium BC", says about ist culture: "A metal which is either copper or bronze was known, as were wheeled vehicles denoted by common words for wheels, axles, hubs and yokes, but not for the spokes of a wheel". In so far as we are able to "decipher" the meaning of Piggott's extremely cautious statements in this respect, he seems to reckon with an (as we have added above: purely hypothetical) Indo-European homeland somewhere between the Caucasus and the Carpathians.

But, as is well known, the question of a socalled "Indo-European language family" and an "Indo-European homeland" has been hotly debated for a long time, and the matter is still far from clear. It is often not even understood that the whole concept of allegedly existing "language families" is far from proven (5). It may well be that the so-called Indo-European languages in reality are creolized or "creole are languages", they i.e. that not genealogically related, which would mean that there would never have existed any proto-Indo-European people and. by inference, no "Indo-European homeland". In addition the matter of ethno-linguistic and cultural origins has even become more difficult, because since about 1988 several non-Establishment scholars have proposed that our conventionally (though provisionally) accepted chronologies for late prehistoric and protohistoric periods might be open to doubt.

If they should even be only partly right, that would be a very serious matter. Because, as the present author has stated elsewhere (6), a garbled chronology would amount to a vertiable "maelstrom of confusion", which would tend to make all our effrts, to arrive at a clear understanding of the developments during the epochs in question, futile.

The East-West versus West-East problem

ALL THESE mainstream opinions, of which we have spoken above, tend to locate the center of diffusion of metallurgy somewhere between, say, the Balkans and Mesopotamia, preferable in the Near East. Which means that, for the European/Mediterranean region, we would have an EastWest diffusion of metallurgy. It would be the old "Ex-orientelux" scenario, or dogma. There are, however, competent non-Establishment scholars who see the thing, quite to the contrary, the other way: they propose a West-East diffusion. The great champion of this school of thought (if it may be called a "school") is doubtless Dayton who, in his voluminous pioneering work on the origins of metallurgy and glazing (7), has meticulously shown that the mainstream "Ex-oriente-lux" scenario is

absolutely incompatible with the known facts about the geographical distribution of metal ores in Europe, North Africa, and Asia.

THIS WORK complies with the highest possible academic standards, and has to be taken very seriously. Dayton proposes a scenario, in which metallurgy stread from Europe (Bohemia/Erzgebirge/Roumania, Cornwall, Iberian Peninsula) toward the Near East and as far as India (Fig.1,2; Tab.l). We will return to this later on.

The role of Heligoland

The well-known non-Establishment scholar. pastor Spanuth (8) has proposed that metallurgy has first been practized by the Atlanto-European Megalithic culture, which he sees as a politically united realm and civilization, especially in northwestern Europe around the island of Heligoland.Meier & Zschweigert (9) have enlarged upon Spanuth in a remarkably comprehensive and competent manner, and I think it will be instructive to cite (translated from the German) some relevant passages from their chapter on metallurgy.

They begin by stating "...that it has become necessary to get rid of some ingrained prejudices, for instance that the European Neolithic (with the exception of southeastern Europe, and in contradistinction to the eastern Mediterranean) had not known metal, that copper at least in central and northwestern Europe had been used only towards the end of the Neolithic, and that copper objects, which had been found there, had been 'imports' from regions where copper ores had been worked already 'much earlier', e.g. from Anatolia, Mesopotamia, Egypt and southeastern Europe'' (10).

MEIER & Zschweigert (11) discuss the overwhelming evidence that the "Copper Age" did indeed begin much earlier in central Europe (before 3700 BC or even 4400 BC) than in southeastern Europe and the Near



Fig.2 (p.8-9): More detailed map, with uncorrected C14 dates, showing Dayton's scenario for the diffusion of metallurgy from Europe toward the eastern Mediterranean and the Near and Middle East (Dayton 1978).



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Fig.1: Rough sketch of Dayton's view on the diffusion of metallurgy from Europe to the eastern Mediterranean and the Near and Middle East (Dayton 1978). His accompanying text shows that he is somewhat undecided between central Europe, western Europe, and southeastern Europe as the center of diffusion for metallury.



Tab.1: Arrangement in tabular form showing Dayton's understanding of the diffusion of metallurgy (Dayton 1978).

East, much earlier than the Bell-Beaker people of the second half of the 3rd millennium BC, who are often alleged to have brought metallurgy from the Iberian Peninsula to other parts of Europe. And with respect to copper ores in northern Europe and their use in metalworking, I would like to cite the following passages:

"Ouite obviously the Establishment has failed to take into account the rich, prehistoric copper ore deposits of Heligoland, which were of highgrade quality... Spanuth substantiated that these copper deposits had already been used by the Megalithic culture, and that the copper objects found in Megalithic burials in the regions around the North Sea had been made of copper from Heligoland" (12). Several authorities in the fields of prehistory and early metallurgy, among them even the well-known Gustav Schwantes, were cited to the effect that they stated, as early as 1935 - 1948, that a clear connection existed between the Megalithic culture of the Atlantic coasts of Europe, and the spread of copper objects.

"In his work ATLANTIS, published in 1965, Spanuth was able to substantiate his theses even more detailed by additional evidence for the very rich copper deposits on Heligoland, and the production of copper there, as early as the Neolithic. He was able to cite chemical analyses of copper ore samples and copper slags by several well-known specialists and institutes in Germany and abroad. These expert opinions were unanimous with respect to the unique composition and high quality of the copper from Heligoland, with its typical percentages of arsenic (As) and antimony but also silver, bismuth and iron. (Sb). Indeed it must have been most advantageous for the early metallurgists... and, because of its arsenic, antimony and bismuth content an end product of great hardness was produced" (13).

THIS MAY suffice for our present purposes. That chapter in the Meier & Zschweigert book about early copper metallurgy should, however, be studied rather carefully and thoroughly by all scholars interested in our problem. It seems rather certain that Heligoland had possessed once, in Neolithic times, enormous copper ore deposits of high quality, and that perhaps there arose the very first copper/bronze industry on the European continent.

<u>The role of Cornwall and the Iberian</u> <u>Peninsula</u>

BUT THERE are other candidates as well. Dayton speaks of the great importance of Cornwall in this respect (Fig. 3,4). And of the ore deposits of the Iberian Peninsula. We have to remember that all three regions -Heligoland, Cornwall, and the Iberian Peninsula - belonged to the territories of the Megalithic culture, or realm, and that they lay in easy seafaring distance from each other. And the Megalithic culture or civilization had been par excellence a maritime culture, obviously also with transatlantic contacts, as evinced by more or less identical Megalithic remains in the eastern USA. At this moment we cannot decide if pastor Spanuth's preference for Heligoland as the alleged center of the Megalithic culture (or realm, or federation) was more of the nature of a private obsession or idée fixe. He may have been right. On the other hand Topper (14), another non-Establishment scholar. has published an excellent study about the late prehistoric and protohistoric civilizations, which existed on the Iberian Peninsula during the epoch with which we are here concerned. Spain might as well have been the center of the Megalithic civilization. Vennemann (15) thinks the bearers of the latter may have been some kind of proto-Semites. In his opiniontheir first known homeland has been the greater Iberian West, from where they only migrated later to the Near East. So the question of Heligoland versus Iberian Peninsula may be of only academic interest.



Map 12 The extraordinary geology of Cornwall, showing a rare area of the world where tin and copper are found together. Arsenic, cobalt, bismuth and antimony are also found. The rare minerals bournonite (CuPbSbS₃) and stannite (Cu₂SnFeS₄) are found in the St Agnes area. Stannite (bell-metal ore) would produce a natural tin bronze, while bournonite would produce a tin bronze with strong traces of antimony.

Although the ores of Central Europe are very similar to those of Cornwall, generally they contain less copper and more nickel and cobalt, and are not so suitable for the production of bronzes.

The mineral veins in Devon and Cornwall are often situated on the coast and the blue copper ores exposed on the face of the cliffs. The mixed copper/tin ores could have been easily worked by early man. It can be no coincidence that megalithic tombs are densely grouped around the copper/tin/lead deposits of the St Just area, while a whole group of early settlements ring Bodmin Moor.

This map is included to illustrate how surface outcrops of ores in an exceptional area could have produced complex bronzes. Analysis of Mycenaean bronzes might well show that the ores were coming from Cornwall, in which case it is not improbable that the antimony for the yellow glazes was also coming from this region (after Dines).

Fig.3: Map showing extraordinary geology of Cornwall, where tin and copper are found together, with comments by Dayton (Dayton 1978, p.70).



Central and southeastern Europe

DAYTON is somewhat undecided (cf. Fig.1 and his accompanying text) about either central, western or southeastern Europe as the center of metallurgical diffusion. I leave it to my readers to study for themselves Dayton's maps Fig.5 and especially Fig.6, and to arrive at their own conclusions.

To me it seems rather obvious that the central and southeastern European ore deposits form a kind of chain from the Harz mountains to the Iron Gates, with each link being not far from the next. Under such distant circumstances it seems certain that each link will have been in contact with the next. News about technical innovations and commercial possibilities will have travelled rather rapidly along this chain. From the Harz mountains to the island of Heligoland (near today's Hamburg), and from the Iron Gates to the Helladic and Mediterranean world, it was not a great distance either. So the eastern Mediterranean could have had trade interconnections with the lands around the North Sea, not only by ship via the Strait of Gibraltar, but also via a terrestrial network of roads. Our knowledge in this respect, for these early times, is as yet, however, rather meagre.

Dayton's general conclusions

To sum up we will here give a short list of Dayton's statements with respect to the results his researches have had:

- A) The European Bronze Age preceded that of the Near East (p.50).
- B) All silver objects found in the Near East are necessarily imports (p.84).
- C) Our conventional chronologies for the ancient civilizations are very unreliable, sometimes garbled, and in general will have to be shortened (passim).
- D) There are several equally possible regions in Europe as candidates, from

where the tin-rich silver in the Ur graves could have been provided (p.109).

- E) Technological know-how with respect to metallurgy and glazing arrived in the Near East from the Ibero-Atlantean West (passim).
- F) Tin did not exist in the Near East, and had to come from either China or Europe (p.50).

There are many more interesting research results to be found in Dayton's monumental work. The above is only intended as a first impression. With respect to possible interconnections with pre-Columbian America, Dayton has the two following, interesting remarks (both p.74):

- G) "In spite of the KON-TIKI and RA navigations it must be almost completely certain that the rich tin ores of Bolivia were not exploited by the ancient Sumerians". I would say: that remains to be seen.
- H) "Strangely enough, the Mayans of Mexico had a form of Egyptian Blue virtually identical to the Egyptian type".

Drawbacks of Dayton's book

THOUGH THE great, even extraordinary merit of Dayton's voluminous work cannot be overestimated and although it has to be regarded as absolutely indispensable literature for anybody concerned with the origin and spread of metallurgy (and glazing), it also has its limitations, to wit its geographical limitations. But of course we cannot make immoderate demands, if a man already has given so much of his time and effort for the furthering of knowledge.

We would need at least two, or perhaps rather three sequel volumes, which describe, from the viewpoint of metallurgy and prehistory, also the rest of the world, beyond Europe and the Near East, i.e. the whole of Africa, the great sub-continent of India, China (in itself already of quasi-continental dimensions), the



Finds of double axe ingots X Tin deposits

Fig.5: Dayton's map of finds of double-axe ingots adjacent to the tin of the Erzgebirge and the copper of the Harz mountains in central Germany (Dayton 1978).





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remainder of Asia, Australia, and of course also the Americas. And this description would have to be equally circumstantial, i.e. detailed with many maps and tabular presentations, as Dayton has given in MINERALS METALS GLAZING & MAN. Without such sequel volumes, all our conclusions will of necessity remain highly provisional, especially in view of the fact that the ancient cultures or civilizations have quite obviously been much more mobile, especially on the oceans, as we thought before.

The role of China

THE REALLY great question mark with respect to all current theories and scenarios about the origins and spread of metallurgy in the ancient world, has to do with the fact that we do not know enough about the role, which ancient India and China have played in metallurgical matters. Western scholars far too often tend to "forget" these great, old, and potent civilizations, and their possible contributions for the advancement of human culture. Perhaps because of a kind of Western superiority complex or collective narcissistic idiosyncrasy. However that may be, today more and more evidence is coming to light that both India and China may have been involved, from the earliest times, in cultural diffusion on a grand scale. In our field, we simply cannot "forget" them.

The famous Shang culture, conventionally dated from about the 18th to the 12th centuries BC, which obviously had overseas contacts e.g. with the very ancient civilizations of pre-Columbian America (16), is well-known for its superbly made bronze objects. But Shang China is not early enough for our purposes. Before the Shang, in traditional Chinese historiography, came the Xia (or Hsia). They are dated to as early as the 3rd millennium BC. As yet no archaeological remains have been identified with the Xia. Though there are no written records from this era, "the advanced level of Shang civilization leads

one to presuppose the existence of a fairly highly developed predecessor"(17). But, most interestingly, as Rodzinski (18) adds: "It should be noted also that the ancient Chinese were firmly convinced that they were the descendants of this dynasty, referring to themselves for many centuries as 'all the Hsia'. There seems to be a good chance that future archaeological exploration will help to throw light on this fascinating problem". All of this, though highly interesting and of a challenging nature, seems as yet a bit meagre.

Dayton (19) has this to say about early metallurgy in China:

"China does not seem to be the home of metallurgy. Tin bronzes appear early in the Shang dynasty (1766-1122 BC) suddenly and from outside, without a preceding Copper Age..". Though I am of the opinion that Dayton's work has perhaps been the most meritorious study with respect to the origins of early metallurgy, I have to confess that I harbour certain doubts as to the correctness of these statements. Again I think it is a case of incomplete evidence. Dayton mentions tin deposits in China as existing only in Yünnan province, and proposes: "On the evidence from Ban Chiang in Thailand it appears that tin bronzes reach China from this area".

OUR ACCOMPANYING Fig.7 is reproduced from Dayton p.433, which shows a bronze bangle from Ban Chiang in Thailand, with Dayton's accompanying text. There exists, however, at least the theoretical possibility that Dayton may be wrong with his statements "that Aegean influences reached as far as Ban Chiang", and "that Mycenaean faience is characteristic of the Indus Culture". Might it not as well be that these motives and objects in reality had their origin in India, and from there - by means of trade, cultural diffusion, or a kind of "Völkerwanderung" - reached the Aegean region in the West, and Thailand in the East? I suspect that here again we have a case of



Fig.7: Bronze bangle from Ban Chiang/ Thailand with running spirals pattern, which for Dayton (cf. his comments) suggested Aegean influences reaching as far east as Thailand, but cf. also my own comment (Dayton 1978). incomplete evidence. We will return to India later on.

Topper's "Horra" scenario

WE HAVE already mentioned Topper's most meritorious book on the lost prehistoric civilizations of the Iberian Peninsula. Already there (1977) the "Horra" play a certain role as a war-like "race" conquering the Iberian Peninsula and subjugating the nations on it, though their true identity remains somewhat Proteus-like, who are said to have had empire about 2.000 years before the Huns of Attila (which would give a date of approximately 1550 BC), with whom they are said to have been ethnically, at least partly, quasi-identical (20).

In his latest book on this thesis (21), and the shortened version of it in MIGRATION & DIFFUSION (22), he enlarges on his "Horra" scenario, which he had first and provisionally described in his work on the Iberian Peninsula. He is now specifying his opinion as follows: the center of diffusion of metallurgy lay around the Altai mountains of Inner Asia, and the spread of metallurgical technologies had been effectuated by the bearers of the metalworking tradition within a so far unsuspected, prehistoric expansionist empire, which had been established by a dreaded ruling class or caste of horsemen warriors. In his HORRA book he mentions the following details, or sub-theses:

- The "Horra" empire existed "at the beginning of the metal age in Europe" (p.10). Alternatively:
- The "Horra" empire existed "according to the latest chronological discoveries about two millennia ago" (p.12).
- 3) The "Horra" empire stretches "From China as far as the Atlantic" (p. 140).
- "An enormous (or vast) catastrophe has annihilated the political structure of the Horra" (p.195). Already in his earlier book mentioned above he had described

this catastrophe as an impact cataclysm of nature, of cosmic origin.

My readers will at once notice that, apart from the of course inherently hypothetical nature of Topper's (admittedly interesting and thought-provoking) general "Horra" thesis it is, however, incompatible with Dayton's scenario. From 1+2 it is also becoming obvious that, since publication of his earlier book of 1977, Topper has become an avowed critic of our conventional chronology (which criticism per se, in view of the evidence, is not so objectionable as some might think). Because 1 and 2 taken together amount to the statement that the metal age in Europe began at about the same time as the Christian religion. Even if some centuries of the Early Middle Ages should be wholly or partly ficticious, and even if there should be discovered some other chronological irregularities before the introduction of the Gregorian calendar (1582), this special proposal made by Topper will probably be regarded by most scholars as too unsubstantiated, even adventurous. Again, it seems a clear case of insufficient evidence, and authors should not demand of their readers to accept (even tentative) scenarios on the basis of such.

Widely diverging opinions, insufficient evidence

THE FACT that we have, with respect to the origins and spread of early metallurgy, so widely diverging opinions among obviously intelligent and able authors, can mean only one thing and allow only one conclusion: namely that as yet the factual basis is much too small to be able to arrive at a sound judgement. There can be no doubt about it. We need more research, and many more, new discoveries in this field.

There is also another aspect of the matter. Today we have come a long way from the rather naive, academic world-view of the nineteen-fifties, when Establishment mainstream scholars from the relevant fields of learning pretended, to have a clear and precise conception or understanding of the details of humanity's evolution during prehistoric and protohistoric times, which needed at most only minor corrections, if any at all.

NOW WE KNOW better. We have become more modest in our expectations. Today we know more about the "science of science", and how difficult it is to arrive at "worldviews" and paradigmata, which can be taken seriously. The present author is a great advocate of scholarly multiplicity, of the parallel existence of diverging opinions and paradigmata. I feel that it is quite okay that many of us have their own "grande idée". All of this will be of help to further, at a quicker pace than would be possible by adherence to only one paradigm, the advancement of the respective fields of knowledge. So I have not in the least anything against one party advocating an East-West spread, and Dayton advocating a West-East spread of early metallurgy, and Topper advocating his "Horra" scenario, and so on.

We must also not forget: Ever more discoveries come to light these days, in increasingly quick succession, which defy their easy integration in paradigms which, until recently, had been believed by the mainstream or "majority opinion" to constitute "scientifically established fact". Such discoveries act, so to speak, as necessary solvents which are capable of dissolving obsolete paradigms. This is the reason why we hear so little e.g. about the unexpected discovery of prehistoric ruins under water the sea near Yonaguni, in Japanese waters not far from Taiwan.

Metallurgy as a synonym for cultural diffusion and maritime interconnections

One thing is certain, however: although primitive, unsophisticated furnaces and forging techniques might conceivably have been repeatedly, quasi-independently invented in several places and epochs, purely locally, by self-made smiths, advanced metalusing cultures as we know them from the socalled Copper and Bronze Age, must already have profited from a no longer negligable amount of cultural diffusion and interconnections. Piggott (6) is absolutely right when he writes:

"Copper is not a common metal; tin, soon used to make the harder alloy of bronze, is rare. A stone-using community can be near to self-suffiency (though long-distance trade in flint, obsidian, and other stones did in fact occur on a rather remarkable scale), but a metal-using one is wholly dependent on its relatively scarce raw materials. Prospectors and miners, traders and middlemen, the organisation of shipments or caravans, concessions and treaties, the concept of alien peoples and customs in distant lands - all these and more are involved in the enlargement of social comprehension demanded by the technological step of entering, in the older archaeological terminology, a 'Bronze Age' ".

In view of the obvious advantages of Sea transport against arduous land transport, with respect to trade with distant lands, Topper (24) is probably quite right when he states: "It seems that the orientation towards navigation is a characteristic feature of the entire copper civilization".

THIS STATEMENT seems, however, to contradict Topper's own map showing the supposed spread of early metallurgy (Fig.8) along purely terrestrial paths. We have the same situation with a similar map, reproduced by Dayton (25), which shows Forbes's theory of the diffusion of metallurgy from the alleged ("mythical" says Dayton) center in Afghanistan: it also shows purely terrestrial paths of diffusion (Fig.9). Topper and Forbes present incidentally rather similar scenarios which postulate an essentially East-West spread of metallurgy, when we study



Fig.8: Topper's map showing spread of metallurgy from center of Diffusion around the Altai mountains of Inner Asia (Topper: Migration & Diffusion, Vol.4, Issue Number 14, 2003).



Fig.9: Map showing Forbes's theory of the soread of metallurgy from a center of diffusin in Afghanistan (Dayton 1978).

them only superficially on the maps, and both do then look like only extensions of more conventional scenarios (like those of Piggott, or Clark, o f which we spoke above). In reality, however, Topper's scenario is highly individualistic and has an "heretic" time frame.

Dayton's scenario shows a marked similarity with that of Spanuth, with the little difference that Spanuth's center of ethnic dispersion and cultural-technological diffusion had been the island of Heligoland in the North Sea. But perhaps the late pastor would instead have accepted Cornwall or the Iberian Peninsula, which after all also belonged to the Megalithic culture, or realm. Anyway both scholars emphasize the importance of maritime interconnections for the spread of metallurgy.

Uncertainty factors and unsuspected interconnections

In whatever manner one looks at all these diverging scenarios: although they have been proposed by responsible scholars, the matter seems rather confusing, and far from settled. Something essential seems missing. Perhaps we need some additional ingredients. As I said above: the whole thing smells of insufficient evidence. It looks like a typical case, in which we are asked to choose, on the basis of (especially geographically) limited evidence, i.e. prematurely, between several possibilities.

IN SPITE OF these deficiencies, if I had to choose today I would probably opt – although with reservations (more on these in a moment) – for the West-East diffusion pattern. I think I would try to amalgamate Dayton's and Spanuth's versions. The East-West proposal, at least in the form in which it is conventionally presented by the "Exoriente-lux lobby", seems, at least to me, less probable. Although I am quite willing to concede that Topper's "Horra" scenario is of the nature of a welcome intellectual challenge.

THERE ARE, however, at least two uncertainty factors with respect to the East-West versus West-East controversy. And it may be possible that some as yet unsuspected interconnections might have existed, in geographical space as well as time, which could seriously challenge all our scenarios which have been developed so far.

About one of these possible interconnections in space and time, I have written in an earlier issue of MIGRATION & DIFFUSION (26). If it could be verified by undeniable evidence that we have to reckon with "antediluvian" advanced civilizations, which later had been more of less annihilated by violent upheavals of nature, then we would have to rewrite our scenarios. It would then be possible that what we have, up until now, understood as the very first beginnings of metallurgy here or there, might in reality have been a reanimation (in a now far less sophisticated culture) of some - perhaps only orally transmitted - tradition, which had its origin in the technology of a precatastrophic, much more advanced civilization. This could have happened simultaneously in several regions, if the cataclysm had been of quasicontinental dimensions, or even worldwide in the case of an even greater devastation.

The role of India

Apart of China (and the prehistoric civilizations of Ancient America), the great uncertainty factor with respect to the East-West versus West-East controversy is ancient India, and the role it may have played with respect to the diffusion of metallurgy. Purely theoretically India might even have been the center of diffusion: from there metallurgy could have spread toward the East as far as Ban Chiang in Thailand, China and even the Americas, and toward the West as far as the Mediterranean or – by sea around the Cape–

directly to Western Europe (Iberia, and the Megalithic civilization generally).

But in vain do we study Dayton's voluminous work: there is no map there for India, which would describe the ore deposits of that great country in the same detailed manner, in which Dayton informs us about Cornwall or the Balkan Peninsula.

BUT WOULD such feats have been possible at all for ancient India? Sadly for India there does not exist, at least to this writers knowledge, such a work as Needham has published with his impressive, multivolume SCIENCE AND CIVILIZATION IN CHINA for the great Far Eastern civilization.

But for our present purposes it may perhaps suffice to cite some pertinent passages from a very fine book by Sahai (27) on the shipbuilding and seafaring tradition of India:

"India's maritime tradition has great antiquity. Archaeological discoveries made in Gujarat have established that India was a seafaring nation five thousand years ago..." (p.III).

"From the days of the Indus Valley Civilization, the coastline of Gujarat was dotted with important ports, like Lothal, which has been dated by the Carbon 14 method to 2000 BC. The advanced technology used in building these ports must have taken a thousand years to develop" (p.III).

"Experts like Charles Verlinden, Chairman, International Commission for Maritime History, Brussels, says that around 3000 BC, Indians were navigating to Mesopotamia and Egypt" (p.III).

"If there were boats and ships on the Mediterranean and the Red Sea in 7000 BC, there is no reason why there were no ships on the Arabian Sea and the Indian Ocean. Alan Villiers... is of the opinion that 'Indian Ocean is the birth place of sailing in the world' "(p.XI).

"On account of depleting supply of oak in England, and abundance of the entire range of shipbuilding materials in India, even the European merchants built an increasing number of their ships locally. The Malabar teak was acclaimed by many as the best timber in the world for construction of ships" (p.XIV). This availability of shipbuilding material was of course already the same in prehistoric times.

"Therefore constant communication between India on the one side and the countries of West Asia on the other from time immemorial was quite natural. But none of these countries had all the necessary materials required for building boats or ships, nor were they so rich in natural resources of a vast variety" (p.4-5).

"INDIAN MERCHANTS also travelled to distant lands with their products to make more profits... They certainly knew Madagascar and whether they had rounded the Cape of Good Hope and sailed up to the west coast of Africa 'is not known with certainty'. On the capability of the Asians in taking their ships to the west coast, Prof. Needham, the well-known historian. dismisses the insinuation that 'Asian sailors never rounded the Cape of Good Hope because of want of courage rather than of technical equipment' " (p.5).

"Says Dr. Suniti Kumar Chatterji, the wellknown historian: 'It seems that Chaldean and western Asiatic, and also probably the Aegean elements, is the oldest stratum of Indo-Dravidian culture. The Dravidians did not travel from South Europe to India, but from India to South Europe' "(p.16). (28)

Concluding remarks and provisional conclusions

I think it has become clear from the presentations and discussions in this article that we are not yet in a position to pronounce with certainty on the problem of the origins, and the paths of diffusion, of metallurgy. Not even in general terms, and even less with respect to the East-West versus West-East controversy. Scholars in this field of research should, for the time being, set aside personal ambitiousness and abstain from prematurely proclaiming "grand" scenarios, and instead concentrate on the numerous "missing links".

Zusammenfassung

Etliche typische Szenarien bezüglich der Entstehung und Ausbreitung von Metallurgie werden skizziert und besprochen, mit dem provisorischen Fazit, dass wir derzeit, wegen noch ungenügender Kenntnisse, noch nicht in der Lage sind, zu diesem wichtigen aber auch schwierigen Problem Sicheres aussagen zu können. Bis auf weiteres sollten wir uns auf weitere, dringend benötigte Forschungsobjekte konzentrieren, um uns eine bessere Kompetenz auf diesem Gebiet zu verschaffen.

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REFERENCES

- e.g. Stuart Piggott: Ancient Europe (Edinburgh 1967) and Grahame Clark: World Prehistory (Cambridge 1969), both passim.
- 2) ClarK. op.cit., p.102.
- 3) Clark: op.cit., p.109.
- 4) Piggott: op.cit., p.80.
- e.g. E. Morgan Kelley: The Metaphorical Basis of Language A Study in Cross-Cultural Linguistics (Lewiston, N.Y. 1992).
- Horst Friedrich: Maelstrom of Confusion, in: STONEWATCH, Newsletter of the Gungywamp Society, Vol.7/No.4, 1988.
- 7) John Dayton: Minerals Metals Glazing & Man (London 1978).
- Jürgen Spanuth: Atlantis (Tübingen 1965), pp.361-396; cf. also by same author: Atlantis of the North (London 1979).
- Gert Meier & Hermann Zschweigert: Die Hochkultur der Megalithzeit (Tübingen 1997), pp.326-358. (Translations H.F.).
- 10) Meier & Zschweigert: op.cit., pp.326-327.
- 11) loc.cit., pp.327-330.
- 12) loc.cit., pp.331-332.
- 13) loc.cit., pp.333-334.
- 14) Uwe Topper: Das Erbe der Giganten (Olten/Freiburg 1977).
- 15) Theo Vennemann: Andromeda and the Apples of the Hesperides, in: Proceedings of the 9th Annual UCLA Indo-European Conference Los Angeles May 23/24, 1997, Journal of Indo-European Studies Series Monograph Series No.28, Washington 1998.
- 16) Cf. e.g. Josefine Huppertz: Forgotten routes used by oceangoing vessels to navigate the world's seas, in: MIGRATION & DIFFUSION Vol.1/No.6, 2001 (p.31); Cornelia Giesing: Das vorkolumbische Amerika aus circumpazifischer Sicht, in: Wolfgang Stein (ed.): Kolumbus oder wer entdeckte Amerika?, Munich (1992), pp.38-67; also H. Mike Xu: La Venta offering No.4, A revelation of Olmec writing?, in: PRE-COLUMBIANA, Vol.1/No.1-2 (1998), pp.131-134.
- Witold Rodzinski: The walled Kingdom A History of China from 2000 BC to the Present, Glasgow 1988, p.15.
- 18) Loc.cit., pp.15-16.
- 19) Dayton: op.cit., p.433.
- 20) Topper: op.cit., p.88.
- 21) Uwe Topper: Horra, Tübingen 2003.
- 22) Uwe Topper: The Beginning of the Metal Age, in: MIGRATION & DIFFUSION, Vol.4/No.14, 2003.
- 23) Piggott: op.cit., p.72.
- 24) Topper: Horra, p.22.
- 25) Dayton: op.cit., p.182.
- 26) Horst Friedrich: The Rise of Neo-Catastrophism and the Case for o Possibly "Antediluvian" Primordial Civilization, in: MIGRATION & DIFFUSION, Vol.3/No.10.
- 27) Baldeo Sahai: Indian Shipping: A Historical Survey (New Delhi, 1996).
- 28) Cf. also in this respect Baldeo Sahai: Aryan Panis Migrate to West Asia, in: MIGRATION & DIFFUSION, Vol.3/No.12, 2002.