JURIJ ALEXANDROVICH ORLOV MEMORIAL NUMBER
JOURNAL OF THE PALAEONTOLOGICAL SOCIETY OF INDIA
VOL. 20, 1977 pp. 205—210. (*For* 1975).

THE DEBT OF PALAEONTOLOGY TO HAEMATITE

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Although Dr. Henri de Lumley and his industrious collaborators in Southern France are separated from us in Johannesburg, South Africa, by nearly 18,000 kilometres a distance, virtually equivalent to the length of the African continent, their analysis of Terra Amata, the 80 metre beach site at Nice has been responsible for causing both their and our attention to become concentrated on one particular feature during the past decade. That is red ochre, the antiquity, ubiquity and supremacy of which substance upon humanity's thinking and activities now creates a palaeontological border-land in anthropology.

The prime sources of my implication therein are two sites lying east from the Transvaal : the Lion Cavern site on the Ngwenya Iron Mine property near Mbabane, formerly the capital of the last little African Kingdom of Swaziland; and the Border Cave in the northern part of Zululand about one hundred miles east from Ngwenya.

The subject of our joint interest is the red ochre of haematite i.e. bloodstone (Gr. *haema*=blood). Dr. de Lumley and his associates found 76 pieces of ochre on the Terra Amata beach site; some of them were irregular or uneven in shape, but some were obviously flaked and others whose form—whether plate-like, cylindrical, spherical, spindled or wedge-like—patently demonstrated their previous systematic use as a colouring substance, presumably for human bodies. My earliest knowledge about these prehistoric Europeans of Terra Amata being Redskins came through *The Emergence of Man* by John Pfeiffer (1972).

Pfeiffer had also attributed to these prehistoric Terra Amata coast-dwelling inhabitants of Southern France and their Acheulean stone culture an antiquity similar to that of the inland elephant-hunting Acheuleans (see Biberson, 1964) of the Spanish Torralba-Ambrona swamplands (F. C. Howell, 1965). The swamp that covered that part of Spain apparently 300,000 years ago to the north-east of where Phillip II decided in 1560 A.D. to place Spain's modern capital, Madrid (i.e. just 415 years ago). The southern European inhabitants of that 300,000-year era were more nearly coeval with *Pithecanthropus* of Java and his cousin *Sinanthropus* of Pekin than with their Pre- or Proto-Neanderthal successors in Europe's last quarter of a million or more years and their sapient successors of much more recent times. Africa too had been occupied in Acheulean times by primitive *Homo erectus* types, such as the *Atlanthropus* whose three lower jaws and large stone axes were found well below water level in Algeria by the late Professor Camille Arambourg in 1954 and 1955. Their seemingly near relative was also discovered in the Olduvai Gorge Bed II in 1960 by the late Dr. Louis Leakey and was dated radiometrically as less than 360,000 years ago.

Whether these Asiatic and African varieties of bone- and stone-tool-using peoples of the Acheulean era of *Homo erectus* were as deeply interested in the red bloodstone as those of Terra Amata only future investigations can reveal. To know their ages relative to one another archaeologists also need a means of dating discriminatively the great time gap between the last 50,000 years that C14 has illuminated so effectively, and the million-year efficiency with which potassium argon and other elements have recast today's ideas of human antiquity and emergence.

The red ochre work in South Africa has succeeded however in providing our generous colleagues in the radiocarbon-dating laboratories of Yale, Groningen and Pretoria with the carbon that has cast sequential light on the last 50,000 years where it was most needed. The historical steps in the more recent story of the Ngwenya Iron Mine during the last 1964-1974 decade can be followed by those sufficiently interested in the successive articles written by Adrian Boshier, Peter Beaumont and myself (see Bibliography). All I am doing here is simply to outline the way in which it happened and the deductions drawn therefrom.

When Adrian Boshier (1965, 1969) was seeking help from the Ernest Oppenheimer Memorial Trust Fund to prosecute his photographic analysis of Bushman paintings in the north-west Transvaal in March 1964, Mr. Alan McKerron then secretary of the Fund, showed him some stone implements he had collected on Bomvu (i.e. Red) Ridge, just three miles from the eastern border of the Transvaal province. There the Anglo-American Corporation and the Swaziland Iron Ore Development Company were just starting to open the mine from which

millions of tons of iron ore (one to two a year) have been sent to Japan during the past decade, first via rail to Lourenco Marques and overseas from there.

Through Boshier's consultation with the local Bantu councillors familiar with Swazi traditions and a trial trench made in one of three sites deemed to be of special sanctity, he brought back a collection of stone implements. They immediately recalled to the Late Stone Age mine for manganese at Chowa, Northern Rhodesia (now Zambia) that had been discovered and developed by Mr Frederick Bush for the Broken Hill Development Company in Zambia (then Northern Rhodesia), and which I had fortunately described thirty years earlier (Dart, 1934).

Dr. F. G. Percival of Sadlers End, Surrey, England, one of the Anglo-American Corporation's consultants who had recommended the exploitation of the Ngwenya Iron Mine fortuitously also visited South Africa in 1964 for the mine's opening ceremony. When he saw these stone implements he spontaneously stated that they reminded him of the hammer-stones, picks, choppers and cleavers he had seen earlier in India. They had been used there by the ancient miners of unknown antiquity in the famous area of Dhalbhum, the eastern part of Singhbhum—the hilly district of the Chota Nagpur plateau, west of Bengal. Its eighty-mile copper belt, rich in hematite and various other valuable mineral resources had also been described by J. A. Dunn (1937) and had a history of undetermined antiquity. Discussion with Dr. Percival about our pathetic lack of knowledge about the source of African prehistoric mining that had patently extended over the 2,000 kilometres separating Swaziland from the Katanga copper belt long prior to the European contact of the last 4½ centuries, led to the favourable consideration by the same Ernest Oppenheimer Memorial Fund to my request for a grant to study the Ngwenya Mine archaeologically during its exploitation made at the suggestion of Dr. Percival.

Fortunately too, Mr. Peter B. Beaumont was also available to undertake the fieldwork and he has been occupied therewith during the intervening decade. In 1966 samples of charcoal from hearth levels in an undisturbed haematite quarry floor on the Bomvu Ridge hillside gave the following radiocarbon dates:—

Yale	..	1712	48-52	in	1550±60	B.P.=400±60 A.D.
GRN	..	5022	36-48	in	1535±30	B.P.=415±30 A.D.
GRN	..	5315	24-36	in	1550±30	B.P.=400±30 A.D.
Yale	..	1995	12-24	in	1430±100	B.P.=520±100A.D.

Castle Quarry was a site that covered about half an acre of the northern slope of Castle Peak to an average depth of five feet indicating the removal of about 200 tons of red haematite. Charcoal from bedrock at widely separated points were sent to Yale and Groningen and brought back these surprising results during 1966:–

Yale	..	1829	Castle Quarry	3970±120	B.P.=2020 B.C.
GRN	..	5023	,, ,,	2860±35	B.P.=910 B.C.

but confirmatory and more surprising dates followed from :

Yale	..	1713	Lion Cavern	9640 ± 80	B.P.=7690 B.C.
,,	..	1714	Banda Cave	3890 ± 80	B.P.=3940 B.C.

These previously unimaginable dates for any South African pre-historic mining tradition stretching back through the first and through the third and fourth into the eighth millennium B.C. were the first corroboration of the Late Stone Age mining I had been advocating for Chowa in Zambia for manganese (Dart, 1934), and also for the Late Stone Age and Ochre-painted petroglyphs of the Nachikufu I era at Chifubwa Stream, near the Kanshanshi Copper Mine in north-west Zambia (Dart, 1931).

In the report about those petroglyphs and the concomitant Late Stone Age culture underlying six feet of sterile sand that had covered them I suggested that possibly four millennia might well have elapsed since they were incised and painted (Dart, 1931). Subsequently charcoal from the cultural stratum and the sand immediately above it had already given a scarcely believable carbon date of 4360 B.C. (J. D. Clark, 1957). But now down in Swaziland, thirty years later and nearly 2,000 kilometres further south, the systematic mining of haematite had apprently been in continuous progress for about twice as long.

This 7690 B.C. date (Dart & Beaumont, 1967) came from bedrock on the cavern side of a 5-10 ton, fallen block of haematite blocking its artificial entrance and situated about ten feet from the cliff-side. So the block was levered away from the cliff and a further parallel trench three feet further out sunk into the deposit it had overlain. Bedrock was reached at a depth of eleven feet through mining debris to a stratum overlying bedrock and containing over 32,000 Middle Stone Age artefacts belonging to the middle phase of that culture.

Samples of carbon from two different parts of this bedrock stratum produced the following dates in 1967 (Dart & Beaumont, 1967):

Yale	..	1827	Lion Cavern	22,280±400	B.P. or 20,330 B.C.
GRN	..	5020	,, ,,	28,130 ± 260	B.P. or 26,180 B.C.

This Swaziland mining for the rich vein of specularite or glittering black 'looking glass' ore and the copious red haematite in the twenty-ninth millennium translated

our perspective beyond historical events into contemporaneity with the middle of the European Last Ice Age, when Southern Europe also was in a state of palaeolithic, or Late Stone Age culture. But it had already become obvious that there must be even older carbon beyond the area that had been compressed by the fallen haematite block. So excavation was continued to the outer intersection of the deposit with the hill-side. It failed to disclose any variation in the type of MSA stone tools exposed, but succeeded in recovering sufficient carbon to be sent to the Groningen Laboratory.

The dating received in early 1969 was:

GRN .. 5313 Lion Cavern 43200 $\pm$ 1200 B.P. = 41,250 B.C.

indicating along with the previous two dates from the same cavern as Dr. J. C. Vogel (1970) states "that mining continued at this oldest mine in the world for over 30,000 years."

These facts, firstly, that mining had been proven to be continuous for 30.000 years in this Lion Cavern site and over 40,000 years in that single Ngwenya Mine locality; and secondly, that haematite had been the central ritual objective of mankind from Western Europe in the north to southernmost Africa in Mousterian times forty millennia ago and was used ritually amongst all Australian tribes of 'the Mousterians of the Antipodes' (W. J. Sollas, 1911); suggested to me that haematite and its mining might well have been conveyed into that continent and Tasmania by their earliest navigating invaders. Although the introduction of ochre mining into the New World has probably been more recent than to Australia its use appears to have extended throughout that continent also. Certainly the redness of the American Indians was due to that and possibly other red pigments rather than to the colour of their skins.

I drew attention to that evidence and the place red ochre had played in an article sent to Professor K. Ghosh (Dart, 1974, pp. 309-20), and further matters relevant thereto were collated (Dart, 1968 b).

The first description of Boskop human remains from the south-east African coast that I had reported (1923) had drawn attention to their 'employment of ochre in their burial rites'. The occurrence of ochre as characteristic of Middle Stone Age deposits in the Transvaal was noted by Reval Mason (1962) and 'from even the lowest level of Pomongwe Cave in Southern Rhodesia which is dated at 42,200$\pm$2300 B. P. and has a culture of Sangoan (or Proto- Stillbay) type, as Mr. C. K. Cooke also personally stated to me at the Pretoria Congress for the South African Association for the Advancement of Science in July 1967 (see also C. K. Cooke, 1963).

A corresponding situation of the presence of red haematite pencils being present even in the lowest level of Border Cave was encountered by Beaumont & Boshier (1972) during their trenching of this important site in 1970-71. Of the adult and infant human skeletal remains recovered therefrom, the infant belonged definitely to the Middle Stone Age part of the deposit. The excavators were unanimously of the opinion that both of these skeletons belonged to the Middle Stone Age horizon whose final zone gave a radiometric dating in excess of 48,700 and 48,350 B.P. This would make the infant "the earliest dated and the youngest specimen of modern *Homo sapiens* known from that period in Africa." according to Dr. Hertha de Villiers (1973). Similarly it seems probable if not absolutely certain that the adult remains have corresponding antiquity as she suggests and represent "a protonegriform, basic *Homo sapiens afer* population, from which the Negro and Khoisan peoples diverged."

Elsewhere in Africa at Broken Hill in Zambia and at Saldanha Bay near Cape Town, a more pronouncedly 'neanderthaloid' type of human being with thickened eyebrow ridges, flattened frontal bones and muzzle-like maxillae typified by the so-called *Homo rhodesienses* has been associated with the earliest phase of the Middle Stone Age cultural remains So it is a matter of outstanding significance that in Border Cave, Swaziland the final MSA zone giving the 48,350 to 48,700 B.P. dating lies stratigraphically at a depth of a metre from the cave deposit's present day surface; and that a further depth of two metres of consolidated stratification lies between this horizon and bedrock.

Border Cave has thus become a critical site for testing the amino-acid racemization technique employed by Dr. J. L. Bada, Scripps Institute of Oceanography at La Jolla, California, and also the thermoluminescence technique with which Dr. J. H. Fremlin has been developing in the Physics Department of the University of Birmingham, England. Extrapolation based upon the sheer thickness of the deposit is suggestive of a date of 100,000 or more years for the initiation of its use as a habitation, but until these various techniques yield consistent and corroborative information we have to content ourselves with reasonable inference based upon the thickness of the MSA deposit.

Carleton S. Coon (1963, p. 335) allowed the Pleistocene period an antiquity of a million years and *Zinjanthropus* some 550,000 years contemporaneous with the australopithecines of Swartkraans and followed by those of Kromdraai and *Telanthropus*. A decade later the chart of time issued by the Editors of the Time Life Books in *The Missing Link* (M. A. Edey, 1972) written for popular instruction admitted the likelihood of australopithecine emergence prior to four million years ago and of Neanderthal man's emergence in Europe about 100,000 years ago.

Three years after Coon's book (English Edition) had been published Bordes (1966, p. 52) was driven

to the conclusion that people must have crossed the inlet in Middle Acheulean times because the flake cleaver, characteristic of that period in Africa had then entered Spain and later penetrated northwards from Spain into Southern France. Coon (1963, p. 576) had also postulated a Mousterian, or even earlier crossing of the Mediterranean from Cape Bon to Sicily and thence to Italy to account for "the Sinanthropus-like features of the [Neanderthal] Saccopastores", which he attributed to race admixture.

The evidence from Ngwenya and Border Cave taken together has thus shown that *Homo sapiens* has been engaged in the mining of haematite for ritual purposes for an unknown period, but apparently extending in all probability far beyond 100,000 B.P. The rich find of haematite objects at Terra Amata now opens up the fantastic prospect of extending still further into antiquity the prehistoric beginnings of mining. Its initiation certainly was not as René Taton described it two decades ago (1957 p. 4 +).

Taton's concept then was that mining had arisen during the Neolithic period as a result of exhausting surface supplies of flint, prospecting for suitable flint deposits and digging deep by our prehistoric ancestors. "Thus, during the first four millennia before our era they founded geology and mining" he wrote under the contemporary assumption that the earliest serious mining was for flint. He mentions incidentally various "minerals of pleasing appearance or colour", which could be turned into ornaments, and amongst them haematite happened to be the last mentioned, which were found "apart from flint".

The value of René Taton's description lies in its demonstrating vividly the completeness of the revision our concepts about mining and its origin had to undergo, when we had been forced by the radio-carbon facts, to transfer them from the Neolithic to the Palaeolithic and its primary objective from flint to bloodstone.

What we have now learned also from the Terra Amata site is that in Europe as well as in South Africa the colour of haematite (i.e. bloodstone) was also the primary stimulus; and that the antiquity of mining and navigation may be multi-millennial in dating.

For we are still confronted by the primary issue of where and why it all began. Did it arise in Europe with *Homo erectus*, 500,000 years ago, because his (or her) attention had already become concentrated upon it, and did the mining of haematite penetrate through the Sahara and equatorial Africa to the southernmost quarter of Africa during the following 150,000 or more years? Or did the fascination of the blood-red and glittering black specularite substance that frequently accompanied haematite simply spread along the coastline and rivers of the Mediterranean Area to reach with the inevitability of fate and time into southernmost Africa and incidentally percolate coastal Asia and Indonesia into Australia and Tasmania? Or did the dedication to colour originate in the Near East or in India and radiate from there?

These are the enigmas of *where*, that only the future dating of intermediate sites seems likely to resolve finally. But the query as to *why*, has found a ready answer in the symbolism of blood. As a potential restorative of vitality to the dead it found a place in burials froms the Red Lady of Paviland in England to Choukoutien in China and in diverse tribal rituals throughout Africa, Australia and the Americas. Since I have dealt with these matters in earlier papers (Dart, 1968 (a) and (b), 1969, 1974) it would only be repetitious to repeat those observations here.

In his article F. M. Bergounioux (1958) summarized the information about Neanderthal burials, chiefly from an osteological point of view. The most useful collection of data about the widespread use of red ochre in burial customs, from Mousterian to Mesolithic times available to me has been that collated by B. B. Rafter's translation (1965) of *The Men of the Old Stone Age* by Henri Breuil and H. Lentier (1959). A revision of these two fields of enquiry in the light of the almost contemporary study by Mercia Eliade, (1958, 1962) is now essential.

The Ngwenya Iron Mine in Swaziland has thus given to us a continuous story of mining back to the forty-third millennium, while Border Cave, a hundred miles away on the Zululand frontier of Swaziland, has carried it back in time to a date that probably far exceeds 100,000 years. But the evidence upon which the antiquity of mining during that 43,000—100,000 B.P. interval is assumed includes the widespread occurrence of ochre in MSA deposits in Southern Africa from Rhodesia to the Cape Province in forms that leave no doubt about its general habitual use in deposits, a number of which exceed in age that of Border Cave and extend into *the earliest phase* of the Middle Stone Age. That cave deposit evidence as yet does not have any concrete mining site antiquity support by radiometric means, such as the Lion Cavern site yielded, any more than does any European ochreous cave deposit, but the evidence is entirely similar to that found at Terra Amata. Consequently, if we assume from the sheer presence of ochre in the multiple forms indicating generalised human use that mining of an ochre deposit had already been initiated, we must concede an antiquity of mining to Terra Amata and to the as yet unknown *Homo erectus* of Southern Europe. It is this possibility or probability that makes the collation of all data bearing upon the presence of red ochre with human remains in every part of the world eminently desirable particularly along the coastlines of the Indian Ocean, and especially if they can be radiometrically supported.

According to Dr. K. Oakley (1964) red ochre occurs

in the Mesolithic deposits of Kenya in East Africa; in the Upper Cave Industry of Choukoutien Hill in China which is Upper Palaeolithic (or Mesolithic) in facies; and also in the Mesolithic *Hoabinhian* culture of Indochina and Malaya. G. H. R. von Koenigswald (1956, p. 24) attributed an age of 25,000 years to the Upper Cave of Choukoutien and Oakley (op. cit. p. 255) stated with respect to Hoabinhians "they spread through south-east Asia several millennia before the arrival there of Neolithic culture."

On October 25, 1972 *The Post*, Wellington, New Zealand carried Professor Macintosh's announcement at a public lecture the previous evening that "Two years ago in western New South Wales proven dates of 32,000 years were confirmed and also human bones of 25,000 years at that site. Therefore man must indeed have got to Australia by sea. He had to cross two straits a mile deep and at least 100 kilometres wide. This makes the aboriginal Australian the world's first mariner".

We still have to learn whether the intense attachment of all recent Australian and Tasmanian tribes to the ritual use of red ochre was introduced by those earliest-known settlers, or at some later stage. But the antiquity of red ochre's Middle Stone Age mining spread to South Africa, its encirclement of the Old World from Kenya to China during Mesolithic times along with the hoary age of the earliest Australian intrusions demonstrate the part that nautical Man's earliest ocean-adventuring vehicles played in the intercontinental and perimundane spread of the life-promoting symbolism attached to red ochre in palaeolithic, presumably Acheulean times.

REFERENCES

BEAUMONT, P. B. 1973a. Border Cave—a progress report. *S. Afr. J. Sci.* **69:** 41-46.

BEAUMONT, P. B. 1973b. The ancient pigment mines of Southern Africa. *S. Afr. J. Sci.* **69:** 140-46.

BEAUMONT, P. B. and BOSHIER, A. K. 1972. Some comments on recent findings at Border Cave, northern Natal. *S. Afr. J. Sci.* **68:** 22-24.

BEAUMONT, P. B. and VOGEL, J. C. 1972 On a new radiocarbon chronology for Africa south of the equator. *African Studies* **31:** 65-90; 155-82.

BERGOUNIOUD, F. M. 1958. "Spiritualitè", de l'homme de Nèanderthal pp. 155-66 *In Hundert Jahre Neanderthaler: Neanderthal Centenara* 1856-1956. Ed. G. H. R. von Koenigswald. Utrecht, Kemtnk en Zoon N. V.

BIBERSON, PÉERRE. 1964. Torralba et Ambrona.. .*In* Miscelaneae en homent e ajal Abate Henri Breuil. T. 1, pp. 20-48.

BORDES, F. H. 1966. Acheulean cultures in Southwest France. *In Studies in Prehistory*. Ed. D. Sen and A. K. Ghosh, Calcutta, Mukhopadhyay, pp. 49-57.

BOSHIER, A. K. 1965. Ancient mining of Bomvu Ridge. *Scientific S. Afr.* **2** (May): 317-20.

BOSHIET, A. K. 1969. Mining genesis. *Mining Survey*. **64:** 21-28.

BOSHIER, A. K. and BEAUMONT, P. B. 1970. Nuclear antiquity 2: Beyond the mists of mining. *Nuclear Activity*, January: 21-26.

BOSHIER, A. K. and BEAUMONT, P. B. 1972. Mining in Southern Africa and the emregence of modern man. *Optima*. **22:** 2-12.

BOSHIER, A. K. and BEAUMONT, P. B. 1974. Report on test excavations in a prehistoric pigment mine near Postmasburg, Northern Cape. *S. Afr. Archaeol. Bull.* **29:** 41-59.

BREUIL, H. and LANTIER, R. 1965. *The Men of the Old Stone Age (Palaeolithic and Mesolithic)*. Paris, Payot, 1959. English transl. B. B. Rafter, London, Harrap, 1965. 272 p.

CRRK, J. D. 1959. *The Prehistory of Southern Africa*. London, Penguin. 340 p.

COOKE, C. K 1963. Report on the excavations at Pomongwe & Tshangula caves. Matopo Hills. *S. Afr. Archaeol. Bull.* **18:** 75-115.

COON, CARLTON, S. 1963. *The Origin of Races*. London, Cape. 741 p.

DART, R. A. 1923. Boskop remains from the south-east African coast. *Nature*. **112:** 623-25.

DART, R. A. 1931. Rock engravings in Southern Africa and some clues to their significance and age. *S. Afr. J. Sci.* **28:** 475-86.

DART, R. A. 1934. Discovery of a Stone Age manganese mine at Chowa, Northern Rhodesia. *Trans. Roy. Soc. S. Afr.* **22:** 55-70.

DART, R. A. 1967. The antiquity of mining in South Africa. *S. Afr. J. Sci.* **63:** 264-67.

DART, R. A. 1968a. The multi-millennial prehistory of ochre mining. *N.A.D.A.* **9:** 1-13.

DART, R. A. 1968b. The birth of symbology. *African Studies*. **27:** 15-27.

DART, R. A. 1969a. The bloodstone source of metallurgy. *Trab. Soc. Portug. Antrop. Ethnol. Fac. Science, Porto*. 119-129.

DART, R. A. 1969b. Indian trans-oceanic navigation: its primary place. *Bull Indian geol. Ass.* **2** (3 & 4).

DART, R. A. 1970. Bloodstone and its iron revolutions. *AGO*. **1:** 7-11; **2:** 8-11.

DART, R. A. 1974. 'The concurrence of mining and symbolism.' *In Perspectives in Palaeoanthropology;* Ed. by Asok K. Ghosh. Calcutta, Mukhopadhyay. 309-20.

DART, R. A. and BEAU-MONT, P. B. 1967. Amazing antiquity of mining in Southern Africa. *Nature*. **216:** 407-08.

DART, R. A. and BEAUMONT, P. B. 1967. Ratification and retrocession of earlier Swaziland radiocarbon datings. *S. Afr. J. Sci.* **64:** 241-46.

DART, R. A. and BEAUMONT, P. B. 1969. Evidence of iron-ore mining in Southern Africa in the Middle Stone Age. *Current Anthropology*. **10:** 127-28.

DART, R. A. and BEAUMONT, P. B. 1970. On a further radiocarbon date for ancient mining in Southern Africa. *S. Afr. J. Sci.* **67:** 10-11.

DE VILLIERS, H. 1973. Human skeletal remains from Border Cave, Ingwavuma district, Kwazulu, South Africa. *Ann. Transv. Mus.* **28** (13): 229-56.

DUNN, J. A. 1937. The mineral deposits of Eastern Singhbhum and surrounding areas. *Mem. Geol. Surv. India*. **69:** 54-58.

EDEY, M. A. 1972. *The Emergence of Man. The Missing Link*. New York, Time-Life Books. 160 p.

ELIADE, MIRCEA 1958. *Rites and Symbols of Initiation: The Mysteries of Birth and Rebirth*. Transl. from the French by Willard R. Trask. New York, Harpre Torchbooks. 208 p.

ELIADE, MIRCEA 1962. The Forge and the Crucible. Transl. from the French by Stephen Corrin. London, Rider.

HOWELL F. CLARK. 1965. 'The First Men of Spain'. *In Early Man*, by F. Clark Howell and the editors of LIFE, TIME. N. Y. 85-99.

MASON, REVIL. 1962. Prehistory of the Transvsal. Johannesburg, Witwatersreand Univ. Press. xxiii, 498 p.

OAKALY, K. 1964. *Frameworkes for Dating Fossil Man.* London, Weidenfeld. 355 p.

PFEIFFER, J. E. 1972. *The Emergence of Man.* N. Y., Harper & Row.

RAFTERS B. B. 1965. Transl. *see under:* BREUIL & LANTIER.

SOLLAS, W. J. 1911. *Ancient Hunters: And their Modern Representatives.* London, Macmillan. xvi 416 p. see also. p. 170.

TATON, RENEÉ 1957. *Anciet and Medieval Science: From Prehistory to A. D.* 1450. Ed. and with a general Preface by Renè Taton. Transl. by A. J. Pomerans. London, Thames & Hudson. 551 p.

VOGEL, J. C. 1970. Groningen radiocarbon dates IX. *Radiocarbon.* **12** (2): 458 and 447-71.

VON KOENIGSWALD, G. H. R. 1956. *Meeting Prehistoric Man.* London, Thames & Hudson. 216 p.