Book Reviews

Palaeolithic Art. Paolo Graziosi. McGraw-Hill, New York, 1960. 278 pp. Illus. + plates and maps. $35.

Because this review is written for *Science* and not for *Art*, it will cover principally the scientific facts and fancies which can be deduced from an exhaustive, beautifully illustrated, and comprehensive volume on European Upper Paleolithic art, and the volume is cheap at the price. This art arose, from no known preceding school, in southern France and northern Spain, at or near the beginning of the Upper Paleolithic period, some 30,000 years ago; and it achieved a vigor of realistic depiction, in several media, almost at the start, and culminated in the Late Magdalenian polychrome paintings in two caves, Altamira in Spain and Font-de-Gaume in France. The former is well preserved, but in the latter the paintings have been nearly destroyed by 50 years of visitors rubbing the paintings with fingers and overcoats, breathing on them, and carving their names on them with penknives. In one cave, Rouffignac, discovered only in 1956, a criminal named Dubois has managed to hack his surname over the painting of an extinct rhinoceros.

In nearly all these caves what is now a bent but magnificent old man, without whose tireless efforts and artistic skill we might know much less about this art, crawled for decades, tracing and copying, and elsewhere he later analyzed what he had carried away. He is the Abbé Henri Breuil, whose name, as it should, occupies a third of a column in the index, and to whom I pay respectful tribute.

Graziosi divides Upper Paleolithic art into two categories: portable (he calls it mobiliary, an awkward translation unsanctioned by Webster) and stationary. Portable art consists of carvings, etchings, and a few paintings, done on antler, ivory, and various stones, all of which a cave man could carry about with him. Stationary art is what he etched, carved, and painted on the walls of caves and rock shelters, as well as a few precious clay models of animals found leaning against walls in the innermost and most secret recesses of a very few caves.

Portable art has been found in 110 sites, distributed as follows: France, 58; Spain, 10; Germany, 10; Italy, 9; U.S.S.R., 8; Belgium, 5; Czechoslovakia, 4; Switzerland, 2; England, Austria, Hungary, and Poland, 1 each. These sites are concentrated in the following regions: southwestern France, between the Dordogne and Loire rivers; the northern flanks of the Pyrenees around the sources of the Garonne River; the Basque coast of Spain, near Santander and Bilbao; and other concentrations long the Rhone, Rhine, upper Danube, Dnieper, and Don.

Stationary art is much more limited; France has 65 sites, Spain 29, and Italy 3. The three main centers are along both banks of the Dordogne River; in the French Pyrenees, as above; and in the Spanish Basque region. Secondary clusters are found in the Rhone Valley and in the distal tips of Spain and Italy.

The European art world of the last part of the Pleistocene is divided by Graziosi into three principal provinces: the Franco-Cantabrian, which is the central one; the eastern European; with an excursion into Siberia as far as Lake Baikal; and the Mediterranean. Portable art is found in all three, while stationary cave art is concentrated in the first and is found less extensively in the third.

The eastern European province extends as far west as Predmost in Czechoslovakia. Its art consists mostly of ivory sculptures, which are so conventionalized that we are not sure whether they represent phalli, women, or birds. It also includes ivory plaques which could have been worn as bracelets or wrist guards, and a decorated mammoth's jaw and scapula. All this art is geometric. Vestonice, also in Czechoslovakia, is the eastern frontier of the Franco-Cantabrian art.

The art of the Mediterranean province has both portable pieces and cave engravings and paintings. While in general it is abstract, some of its human representations are the most realistic of all. In what follows it will be lumped with the Franco-Cantabrian product.

The materials of portable art are ivory, antler, bone, limestone slabs, steatite, stream pebbles, and clay. Those of stationary art are the cave walls themselves, cave clay, and pigments of magnesium, red and yellow ochre, and kaolin. The tools used on both were burins of several kinds and sizes, possibly tubes for spraying pigment in solution, and probably spatulas. Lamps have been found in which animal fats were probably burned. How the artists reached the ceilings is unknown.

The time is from the Lower Perigordian through the Aurignacian, Solutrean, and Magdalenian, a span of nearly 20,000 years. Portable art goes through without a halt, but the cave painting is believed to have stopped temporarily during the Solutrean, which was a time devoted to sculpture in the near-round on the walls of rock shelters and at the mouths of caves. It is very hard to date cave paintings in any case, and much of the chronology rests on estimates of style.

Style and Subject

Nevertheless there is continuity in art style from beginning to end, which suggests a continuity in people and in their cultural traditions. The succession of flint knapping techniques, upon which archeologists relied for their chronology before carbon-14, can now be taken as a succession of technical inventions or diffusions, or both, without necessary change of personnel, for otherwise the art would have died or changed.

The subjects of this art are mostly animals, the depictions of which are as useful to zoologists as to esthetes. Mammoths have high domed heads, shaggy hair, and, as one would expect in a cold climate, small ears. Bison resemble the surviving European species. In *Bos primigenius* the bull has a black coat and the cow a red one, which is correct. Horses look like tarpans, although in the Mediterranean province, at least, some suggest *Hemippus*, the half-ass, recently extinct in western Asia. The deer family is represented by elk

(moose), red deer (elk), reindeer, and fallow deer; the pig tribe by *Sus scrofa*. The ibex is common, as are bears both cave and brown, and felines hard to identify further. One curious beast in Lascaux might be *Pantholops* or *Oryx*. Fish are well drawn, representing salmon, pike, and sole, but birds are drawn sketchily, like people; the vegetable world is hardly shown at all.

Human subjects are mostly exaggerated or caricatured. Only in two sites, La Magdaleine in France and Addaura in Sicily, are realistic cave engravings of normal people to be found. In statuettes, cave entrance bas-reliefs, and engravings on loose rocks, the usual human subject is an obese woman similar to some seen in diabetic clinics today, and their kind of obesity is familiarly Caucasoid. In some the external genitalia are emphasized in a manner frowned on by the U.S. Post Office. Wall engravings and paintings show facial features, beards, hair, and even skin color which are as European as those of the living inhabitants of Franco-Cantabria. The realistically lounging bodies of two women in La Magdaleine and the figures of several men in Addaura are the same. These representations assure us that the soft parts of the Upper Paleolithic Europeans of that region were as Caucasoid as their skulls and long bones and, thus, should dispel the well-publicized fancied resemblances between certain Upper Paleolithic skulls and those of Eskimos and other non-Caucasoid peoples.

Beside animals and men, the sculptures, engravings, and paintings represent a number of unidentified objects; tectiforms, shield signs, blazons, club signs, and projectile signs. Tectiforms are line drawings, pentagonal in section, which look like diagrams of huts with overhanging eaves and central poles. Sometimes human or animal figures rest in or on them, sometimes other lines crisscross them, as if to represent poles or cords. These representations have been called huts, tents, tread traps, and even spirit-placings. No one, of course, really knows what they were.

Shield signs look exactly like oval shields. Blazons are rectangles irregularly divided into six or more smaller rectangles of irregular disposition which are painted different colors, and looking for all the world like the art of Mondrian. These have been called tribal coats of arms. In Lascaux an ungulate has its front hoofs resting on two of these, and this juxtaposition could make them shaky pit covers, or be just a coincidence. Club signs look like hafted axes or knobbed maces. Certain shafts feathered at the butt and often sticking out of animals, or even the buttocks of one man, probably represent darts cast in spear throwers, of which many have been found, rather than arrows, for we have no evidence of the use of the bow except possibly in Spain.

In the portable art, particularly engravings on antler and ivory, attempts were made to depict scenes involving several animals, or even herds. In a carved spear thrower head, two ibexes face each other with forelegs locked, apparently wrestling. But in the cave art almost all animals are presented without reference to other compositions; in fact, they are often superimposed. This disregard for earlier work reminds me of the practice of Australian aboriginal cave artists today; periodically they visit sacred rock shelters to renew old paintings, either by retouching or by painting over them. The motive of these artists is apparently a desire to renew and to intensify old relationships between men and the timeless spirit world, the same one which impels these very aborigines to act out totemic rituals. The result, of course, is a reenforcement of human relations within the group concerned.

Interpretations

Many archeologists, ill-versed in ethnology and ignorant of the functional point of view, have conjured up fan-

Deer, shown with few details but perfectly executed relief, from the cave of Niaux, France. The painting is in a circular chamber 800 meters from the opening of the cave. [From *Palaeolithic Art*]

tastic reconstructions of what went on in these caves, emphasizing particularly sexual orgies and the initiation of frightened youths. Fat women and pregnant or copulating animals are read as fertility symbols, but primitive hunters know little of fertility, even today. Their job is to catch, not to breed, animals, and as every hunter knows an animal is most easily killed when preoccupied with sex or heavy with young. Fat women are no more fertile than skinny ones, just softer, warmer, and more conspicuously well-fed.

Another cliché of cave-art interpretation is that the masked or disguised men are all potent shamans or sorcerers. In primitive societies masks and disguises are almost universal and serve several purposes. Many of them, particularly among hunters, represent animals. They may symbolize an animal who once entered into a close relationship with an ancestor through some kind deed. Wholly without abstract symbolism they may represent a hunter disguised as an animal and mingling with an unsuspecting herd until close enough to strike.

Such disguises can be used in ceremonies, even little plays, which welcome the ancestral spirits home for the winter and bid them good-bye in the spring, or as disguises to conceal the identities of individuals in initiations or secret executions. If these figures represented deities such as the "owners" of animal species, one might expect them to be executed with as much care as the animal figures themselves, which is rarely the case.

In the Addaura cave etchings an actual scene is shown. Two men, apparently trussed up Commando-style, with heels held behind buttocks and tied by a cord running up their backs to their necks, flounder around with either erections or penis-sheaths in the midst of a circle of spectators whose arms are raised. What this window on the past means many have fancied but no one knows.

May I conclude by saying that looking at the plates of this book is an experience which cannot be conveyed by a subesthetic scientist in a review. Those interested will have to look at it themselves, or better yet visit the caves, with their hands behind their backs.

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Special Relativity. W. Rindler. Oliver and Boyd, Edinburgh; Interscience, New York, 1960. 196 pp. Illus. $2.25.

This textbook of the special theory of relativity covers all the essentials of the subject at a level that can be managed by a better-than-average undergraduate. Most of the results are presented in both four-dimensional and three-dimensional notation. Many of the exercises present real challenges and cannot be answered without some conceptual effort. Though the book appears to be conceived primarily for the type of instruction common in British universities, it might well be used in the United States, either as a basic text in a regular course on special relativity, or in an undergraduate honors course or seminar.

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The Bacteria. vol. 1, *Structure*. Irwin Clyde Gunsalus and R. Y. Stanier, Eds. Academic Press, New York, 1960. 513 pp. Illus. $13.

Not since Duclaux's *Traité de Microbiologie*, published more than half a century ago, has so comprehensive a treatise on a bacteriological subject been published as this series will represent. That five volumes are taken to do justice to the bacteria and that, even then, they deal almost exclusively with the true bacteria testifies to the amazing expansion of bacteriology, especially in the last 20 years.

Whereas the undertaking was heroic, the fulfillment, judging from the initial volume of the series, has to be regarded as short of outstanding. True, most of the important, recent, factual information on eubacterial anatomy is there; one can find no major fault with the adequacy of the volume in this regard. Yet, in spite of this and in spite of the major-league caliber of the contributors, this particular book is unlikely to become the microbiological classic to which it obviously aspires.

To those familiar with Topley and Wilson's masterly *Principles of Bacteriology and Immunology*, a treatise which in the coverage of its particular areas is comparable to *The Bacteria*, the contrast between the two major works is immediately evident. If I were allowed but one observation to distinguish the two, I would say that Topley and Wilson synthesize their field whereas Gunsalus and Stanier dissect theirs. Both stylistic approaches have their devotees, but the influences and longevity of the former are greater and infinitely more stimulating and gratifying.

This first volume of the proposed set is a tremendously uneven collection of reviews, divided according to the various anatomical parts of the bacterial cell. To be sure, the editors apologize in the preface for the disparities, but even they must have—or should have—grimaced painfully when sandwiching these chapters between the covers of one book. The conspicuous, avoidable defects of the last comparable multi-authored treatise on bacteriology—namely, Werkman and Wilson's *Bacterial Physiology*—should have forearmed Gunsalus and Stanier. This raises the question of the function of the editors in an enterprise of this nature, on the assumption that they are not mere figureheads.

In short, this volume, while doing a competent journeyman job, is singularly imperceptive of the larger and more meaningful opportunity which still cries for materialization. The void is all the more conspicuous now, but we shall be sustained by the belief that some microbiological scholar, who is also facile of expression, will, with perspective and insight, fuse the diverse elements of bacteriology into a profluent magnum opus that will be a focal landmark, as well as a milestone, in the field.

The individual chapters are as authoritative as one could wish; they were written by investigators most of whom are regarded by some others, and by themselves, as high priests of bacteriology. The articles are virtual ringers for the several reviews on the same topics which have appeared in various journals and symposium volumes during the past few years under the names of many of the very same authors. As mentioned above, this is essentially a collection of updated reviews. Beginning students and other novices will be greatly serviced by this convenient source of salient facts and by the extensive up-to-date bibliographies. The book, and its succeeding companion volumes, will be a godsend to every Ph.D. candidate in all branches of microbiology.

Disregarding the heterogeneity and disproportion of the treatments, most of