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## LITOGRAPHIC LIMESTONE: A CLOSE ENCOUNTER BETWEEN PALEONTOLOGY AND PRINTMAKING

The term Lithographic limestone brings to mind different interpretations: "Art", maybe; "Lithography", more specifically. Those who are more technical or historical minded could think of: "Lithography, "Chemical Printing" an invention as important for civilization as moveable typography, a revolution in picture printing technology. If you were to ask the contemporary Geologist, without doubt, Lithographic Limestone would be related to Fossil Preservation. This natural lithic substance has preserved exquisitely, fossils that provide us with excellent notions of the variety of life forms that inhabited our planet millions of years ago. Calcium Carbonate fine grain sedimentation preserved not only bones but soft bodily parts such as skin, muscle and internal organs, invertebrates and plants as well.

Among a variety of limestones, the ones considered "Lithographic" have a unique value for Printmaking and Picture Reproduction. Cut to a calibrated flat slab, the fine compact grain renders a smooth even surface on which grease in the form of drawing materials can be applied. The thickness and hardness of the slab allows it to withstand the pressure of the lithographic press, which can be up to 400 lbs. Per square inch. High concentration of calcium carbonate into the physic condition of a slab makes possible Lithography scientific name: "Chemical Printing". Aloys Senefelder, who invented Lithography and Chemical Printing in Munich in 1798, gives a brief over view of his invention": Lithography is a branch of a new method of printing, differing in its fundamental principles from all other methods now in use, and known by the name of " Chemical Printing".

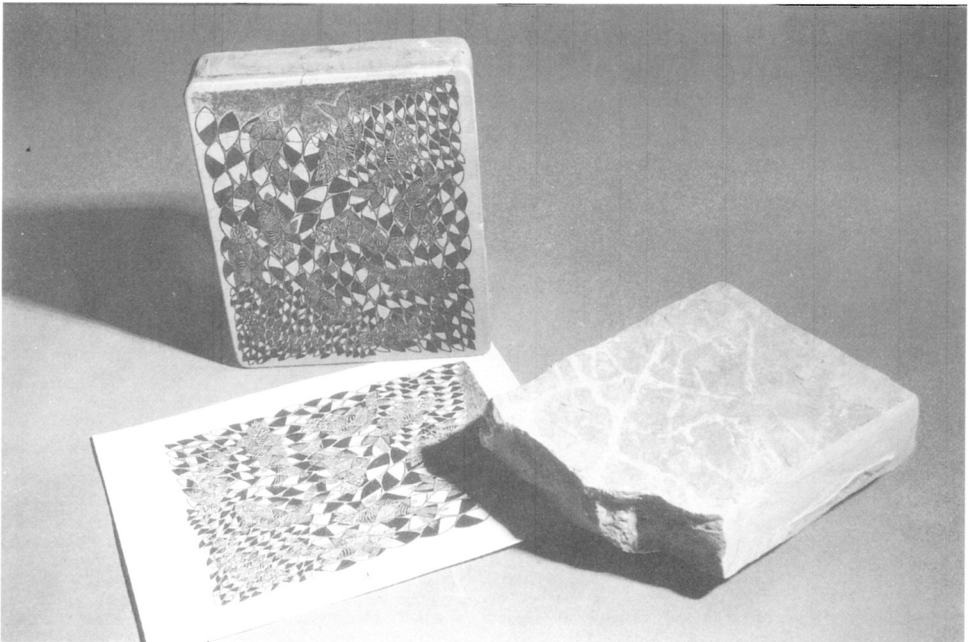
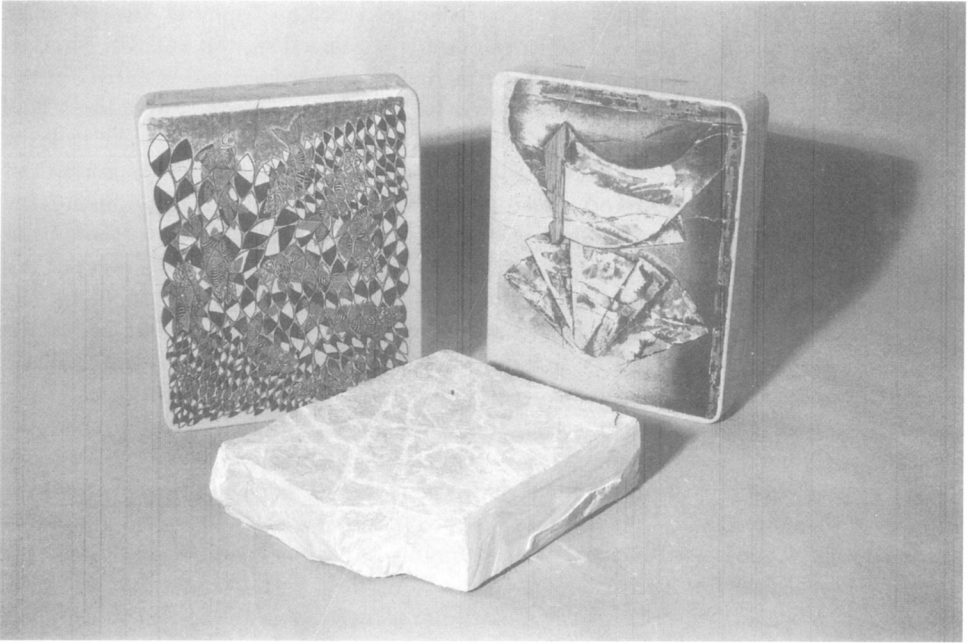
It is of special interest that the greatest fossil locality, Solnhofen, provided for more than century lithographic limestone slabs to the world. Throughout the nineteenth century, Lithographic Limestone was employed around the world as the most versatile printing element, from artistic works to commercial products. The reproduction of paintings, political cartoons, music and sheet music covers, cigar labels and letterheads for official stationary. Although printing from stone has become obsolete in the commercial printing industry, the chemical principle behind lithography has made Offset Printing Technique the winner in the commercial field. Offset printing is a direct derivation of "hand" Lithography, based in the concept of "Planography": image making and printing involving a flat surface. In the modern world of high speed printing, in which printing elements are generated digitally by computers, visual information is taken for granted. We are surprised when we remind that lithographic limestone was the pioneer printing element to permit the representation of the actual textures of objects and to permit the distribution of

identical images in quantities of tens of thousands. How important this was for the modernization of science, technology and Fine Arts. Lithographic Limestones have an undeniable weight in cultural and scientific heritage.

Before Senefelder's "Chemical Impression", printing methods can be divided into two branches: relief printing and intaglio printing. To the first branch belongs the Common letterpress printing, movable typography. Under the second branch may be included all the different methods of engraving and etching on metal. Ink lies in the cavities of the plate. "Chemical Printing allowed to reproduce pictures and letters without a relief. Composed of more than 98.5% of calcium carbonate, the action of acid substances change its composition on the surface of the plate. Nitric Acid combines producing calcium nitrate and a neutral ester, areas of the plate (calcium nitrate), turn hydrosopic and repeal ink, other areas (neutral ester) of the plate turn oleophilic and retain ink, an image can be reproduced with great fidelity on the surface of the stoneplate without a relief. The natural antipathy between water and greasy ink defines blanks and black. The behavior of other limestone submitted to "Chemical Printing" tests is not the same.

Senefelder makes no mention of lithography as an artistic medium. He concerned with the speed and economy that his invention would offer to commercial printing. The first to make artistic drawings on stone were the highly skilled copperplate engravers who understood the lithographic stone as an extension of the copperplate. The engraver substituted the burin for the pen. By eighteen ten a number of lithographic establishments were set up in Paris and it was here that French artists discovered Lithography as a drawing medium, adaptable to the personal touch of each and every Artist. Drawing on stone was as simple, as direct, and as difficult as drawing on paper. It wasn't until eighteen twenty-four, however, that Lithography came to the attention of the great French painters. Francisco de Goya, a Spanish in exile in Bordeaux, France, stood stones up on his painting easel and drew a series of bullfights, thus creating the first great works "Self Expression" in the medium satisfying as a color painting. He was followed by great painters as Delacroix, Daumier, Degas, Lautrec, Bonnard, Vuillard, Matisse, Picasso and ultimately by practically every prominent painter in other countries as well.

Mexico can boast a proud lithographic legacy that began with the founding of the first lithographic establishment in 1824 when Claudio Linati, born in Italy come to our country with this purpose. While modern painting in most countries rejected graphic imagery in favor of color and abstract forms, Mexico developed a school of mural painting that combined graphic representation. Painting in Mexico has evolved throughout the twentieth century to include an intense register of color, yet the graphic elements remain strong. As a painter and lithography printer, my interest in Paleontology has grown, therefore, I'm concerned with the lithic support in which fossils are imbedded. The discovery and exploitation of new sources of Lithographic Limestone that meet the requirements for the printing of artist's lithographs is the quest of the multidisciplinary project we have undertaken. A quest that can be achieved by Artists and Paleontologists sharing information. In 1996 I was invited to participate in a Science and Art project with the "Museum of the Geologic Institute", UNAM, in the representation of a Geological Outcrop. I visit several outcrops to obtain familiarity. At the "Barranca Tlayua" quarry, Puebla, known by the, abundant fossils of the Cretaceous, being familiar with the chipped edges of Bavarian stones I recognized the same characteristics in the clean conchoidal



fracture of the “Barranca Tlayua” stones. The paleontologist Luis Espinosa Arrubarena let me know that the stones could be “Lithographic”. Since 1982 he and Dr. Shelton Applegate have been investigating the outcrop and rescuing the fossil material. In the theory lithographic printing could, be done on the “Barranca Tlayua” limestone. “This would have scientific importance to support our classification”. We would like to learn about the technique that gives a name for this particular kind of stone. Paleontology and Lithography grew hand in hand. During the nineteenth century, the demand for lithographic stone was outgrowing the capacity of the Bavarian quarries at Solnhofen and Francine. Exploration into potential stone reserves was undertaken in many parts of the world. With the exploration and exploitation of quarries for the purpose of supplying the worldwide growing printing industry, fossils were always found, to the delight of the Paleontologist. Lithographic quality limestone was in fact found in France and Italy. So abundant was the supply of fossils that the discipline of “Lithographic Limestone Fossil Preservation” was defined as an independent field of study.

The future of Stone Hand Lithography as a medium of artistic self-expression is seriously challenged due to the scarcity of high quality stone. With the evolution of chemical printing to rotary presses and metal sheets, replacing the stone, lithographic stone was discarded. Art Schools, Artists and Fine Art printing workshop have acquired surviving stones. Several quarries in Europe continue to exploit high-grade stone for hand lithography, however, the price of Bavarian stone plus shipping to the Americas, place them beyond the reach of most artists and Art Schools. For decades hand lithographic printers and painters have been searching for substitute stones of quality similar to that of the Bavarian Limestone. Paleontology is the clue for Lithographic Limestone localities.

Protection and Exploitation of the layers that can be prepared as slabs for Lithography is the main purpose of a growing multidisciplinary team; involving the owners and workers of the quarry, (Aranguthy Family), Earth Scientists, stonecraft workshop, printers and artists. Teachers and students of Art Schools have been the pioneers of printmaking with Mexican alternate Lithographic Limestones. May be some day the Lithography workshop will have limestones from all around the world for mixed techniques or special uses. Stone hand Lithography and Prints could emerge with all their color and beauty.



