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FIBERGLASS MOLDING TECHNIQUES IN PALEONTOLOGY

Clifford J. Jeremiah

Jacksonville, Florida

A Publication of the

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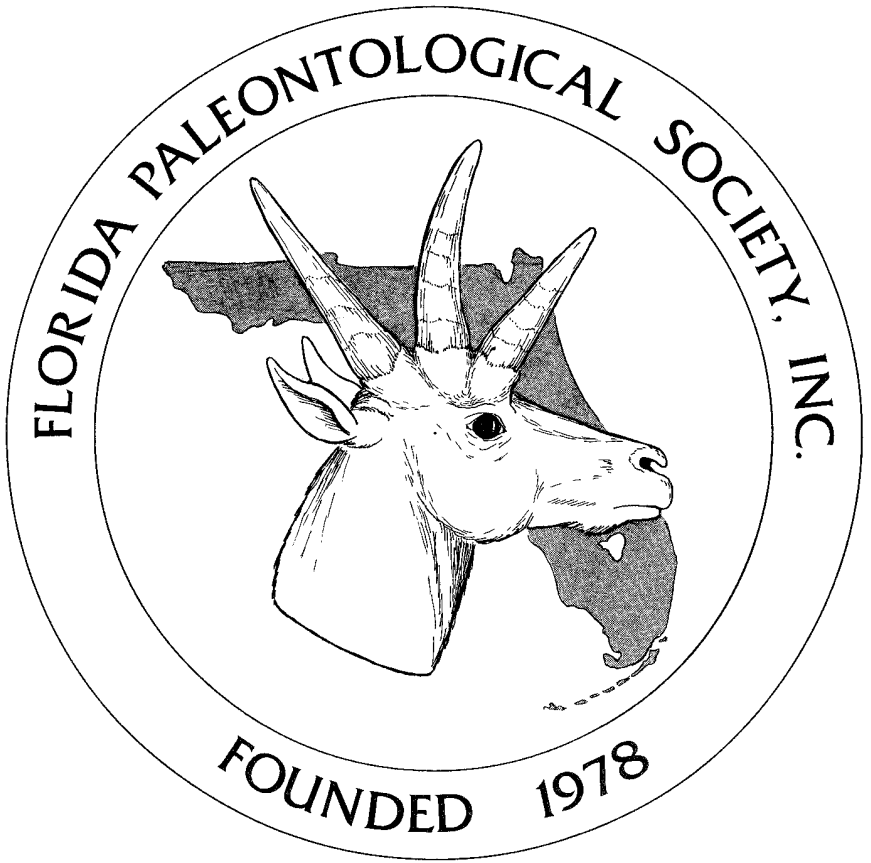
Official News

THE FPS LOGO

Based on the recommendations of the members present at the 4th Annual Meeting held in Gainesville last October, the official logo of our Society is presented below. We are greatly indebted to Barbara Webb for her artistic expertise and time devoted to the creation of this logo (Bruce J. MacFadden).



THE FIFTH ANNUAL PALEONTOLOGICAL MEETING

As announced in *The Plaster Jacket*, number 34, the Fifth Annual Paleontological Meeting will be held in the J. Wayne Reitz Student Union Auditorium (second floor) at the University of Florida on Saturday, 11 October, starting at 8:00 a.m.

Based on responses from the membership, an afternoon laboratory session is planned at the Florida State Museum for those not planning to participate in the field trip. By the time you receive this issue of *The Plaster Jacket* the preregistration deadline will have passed, so you will be able to register on the day of the meeting (Bruce J. MacFadden).

FPS 1981 FIELD CAMP

The responses received to date have been positive and display considerable uniformity about the desire for an excavation at the Thomas Farm site. However, we do need a greater response before planning specific details. All interested persons who have not done so are urged to fill in and mail their questionnaire, which was sent out in the last issue of *The Plaster Jacket* (Ed Brown, Chairman, 1981 Field Camp Committee).

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FIBERGLASS MOLDING TECHNIQUES IN PALEONTOLOGY

Clifford J. Jeremiah[1]

When unique and exciting fossils are discovered there is oftentimes a desire to make reproductions of them. These reproductions are desirable for many reasons, such as research, teaching, and exhibition. Traditionally, casts of fossils have been produced using plaster of paris. However, the molding and casting of large fossils present some unique problems. Over the past decade, I have experimented with other materials in an effort to improve the molding and casting techniques of these types of specimens. In this article, I intend to discuss the use of latex molds with fiberglass overmolds for the production of hand lay-up fiberglass casts.

Using this technique requires certain prerequisites. The specifications of molds and cast parts are as follows:

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[1] Dr. Clifford J. Jeremiah is an Emergency Physician practicing in Jacksonville, Florida. He has been actively involved in the reproduction of a wide variety of fossils over the last 10 years.

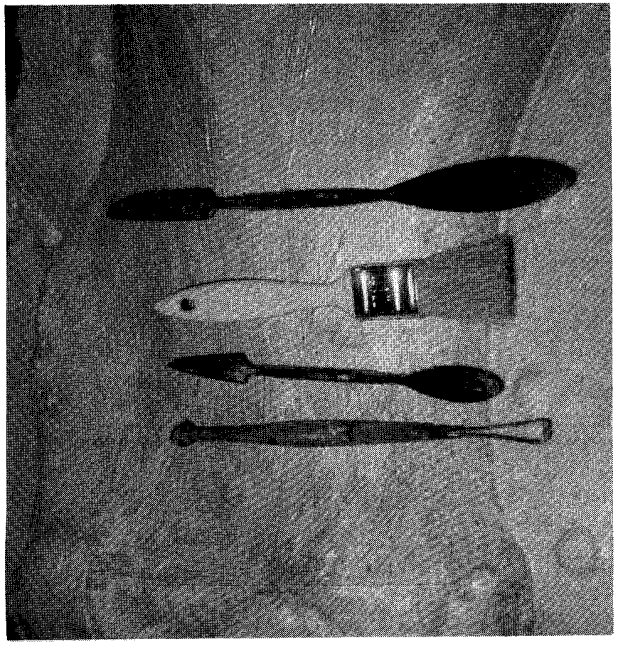
The latex mold should be easily removable and consist of as few parts as possible. The overmold should be strong, lightweight, and lock around the latex mold. The cast should be lightweight, strong, and durable and have a surface that shows small details and is easily painted with an air brush so details will not be obscured. These specifications pose many problems for paleopreparators using traditional plaster techniques. The following discussion is intended to illustrate how some of these problems were solved using a hand lay-up fiberglass construction method. No attempt will be made to compare these techniques with alternate methods and substances. However, the reasons for using the methods and materials will be explained. Brand name materials and their suppliers will be given at the end of this article. The present article is intended to be a continuation of the principles of fossil preparation discussed in *The Plaster Jacket* number 26 entitled "Techniques in Paleontology" by Howard Converse.

PROCEDURE

A. Latex Mold

When using the hand lay-up fiberglass construction method, the least number of latex mold parts is two. There is no limit to the number that may be used but the fewer mold parts, the fewer mold seams, and therefore the more perfect the cast. Latex molds will overcome undercutting, but the number of parts is determined to avoid entrapment. Entrapment occurs when the latex mold cannot easily be removed from the fossil or cast without damage to the mold.

After the number of latex mold parts are determined and their perimeters drawn on the fossils, a standard water base clay border is applied around the part to be completed (See *The Plaster Jacket* no. 26). Indentations made from a small light bulb are placed 4" apart to form locks in the latex. The clay is then sprayed with clear acrylic which helps seal the clay from the latex. The reason for this procedure is that the latex is water-based and will dry faster if separated from the water-based clay. In addition, a layer of clear fiberglass resin can be brushed over the clay. The clay border and fossil are then waxed with a fiberglass separating wax and allowed to dry for two hours. The fossil and clay borders are then painted with water-based



Left: Tools used for forming clay and applying fiberglass.

Right: Clay border around vertebra showing indentations or "locks" made from small light bulbs.

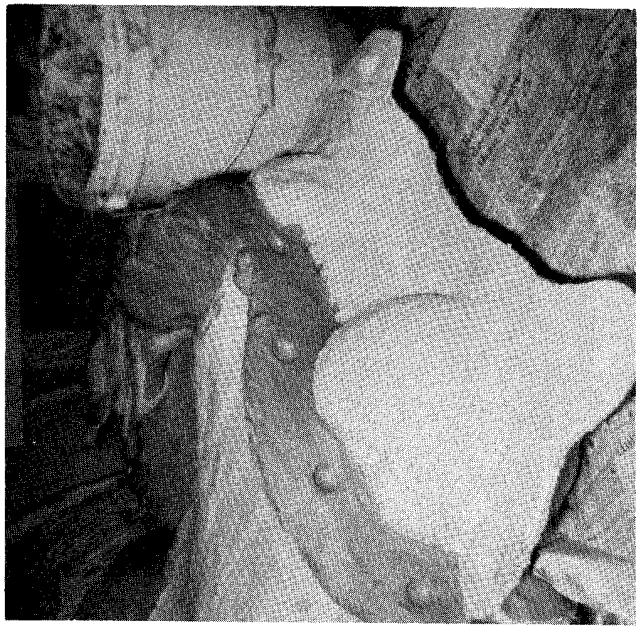
latex. Three base coats, then cheese cloth (4" x 4") coated with latex and two additional layers of latex are applied. Each is allowed 24 hours drying time. Instructions for the latex use accompany the product.

When the latex mold has dried, the edges are trimmed with a razor blade and the mold is marked to show the number of fiberglass over-mold parts needed. This is determined by the amount of undercutting present. Undercutting causing entrapment has to be avoided. A wax separator is then applied.

B. Fiberglass Over-mold

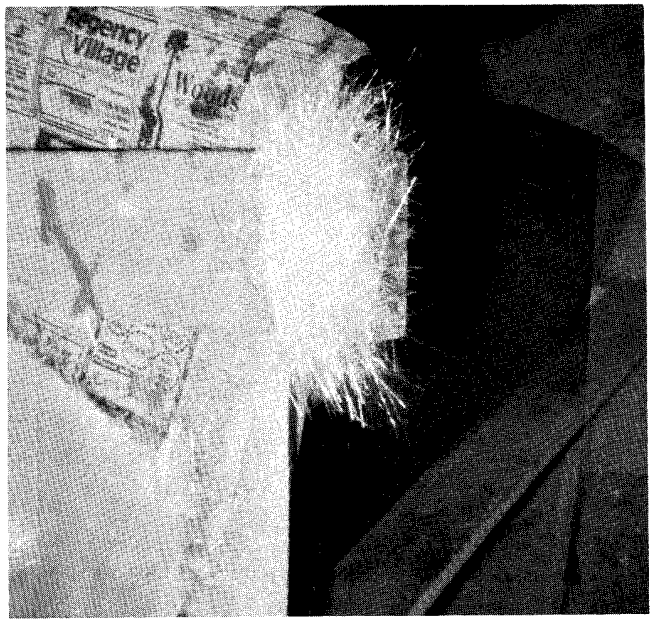
The fiberglass overmold must extend over and beyond the latex mold and lock to insure proper position. Clay is extended 2" beyond the latex mold to form locks and over the latex mold to form separation borders for the fiberglass overmold parts. Again locks are formed at 4" intervals and the clay is then sprayed with acrylic lacquer. A layer of gelcoat is applied and then allowed to set to a rubbery stage. A more perfect part can be obtained if the first gelcoat layer is allowed to harden and then an additional gelcoat layer is applied before the next step. The second gelcoat layer should be allowed to become tacky before fiberglass is applied. The entire mold part is then covered with small pieces of fiberglass matt about 2-3" in diameter before the gelcoat hardens completely. Hand lay-up resin is next used to coat the fiberglass layer. Two more layers of fiberglass are applied and soaked with resin using a standard brush. Additional fiberglass layers are applied to the locks and borders. This prevents breakage when the clamps are tightened during the casting process. When the resin reaches the rubbery stage a razor-blade knife is used to trim the edges. Six-hour curing is allowed. Then, (1) the fossil is turned, (2) the clay is removed and borders washed, (3) the mold borders are waxed to prevent the next part from sticking, and (4) the latex mold with fiberglass jacket process is repeated.

When the fiberglass mold is cured over the latex mold, the edges are sanded for easy separation and holes are drilled between the locks to allow small bolts to hold the mold jacket together. The overmold and latex mold are then stripped from the fossil.



Left: Second half of latex mold started over head of sloth femur.

Right: Clay border over latex mold to be used for a small fiberglass overmold. Note indentations made with a small light bulb.



Left: Fiberglass matt piece used for construction of overmolds and casts.

Right: Completed and trimmed fiberglass overmold part.

Rough edges of the overmold are sanded and the overmold is waxed to prevent resin from sticking during the casting process. The latex mold is trimmed of unwanted material and allowed to cure an additional two days before use.

C. Casting the Fossil

1. The latex molds are sprayed with P.V.A. separator and allowed to dry.

2. A thin layer of white gelcoat is applied to the mold and allowed to harden completely. This layer insures a good impression of the fossil. A second layer of gelcoat is then applied. Fiberglass matt is layed over the entire mold. Using hand lay-up resin, an additional one to two layers of fiberglass are applied. When the fiberglass has reached a rubbery stage, the edges are trimmed with a razor-blade knife to conform to the mold pattern. All mold parts are layed up in this fashion. The mold can then be put together to see if the edges fit. If not, additional trimming is necessary.

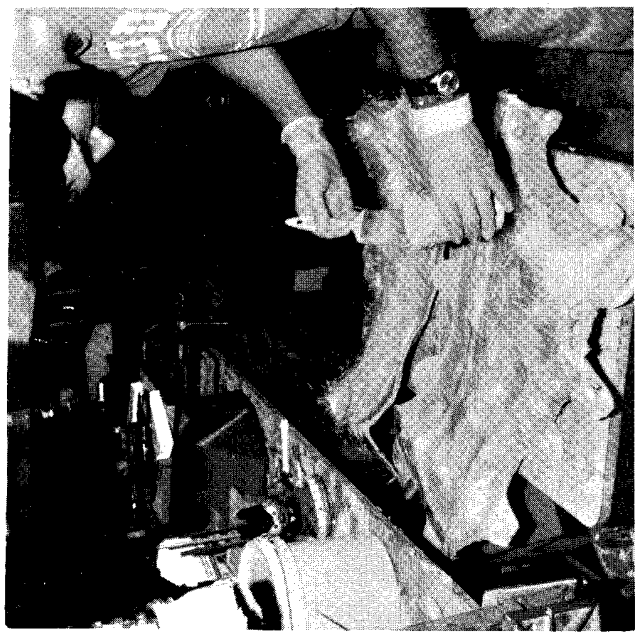
3. A sufficient quantity of gelcoat thickened with ground fiberglass (Aerosil 200 to the consistency of mayonnaise) is then catalyzed and applied to the pattern edges.

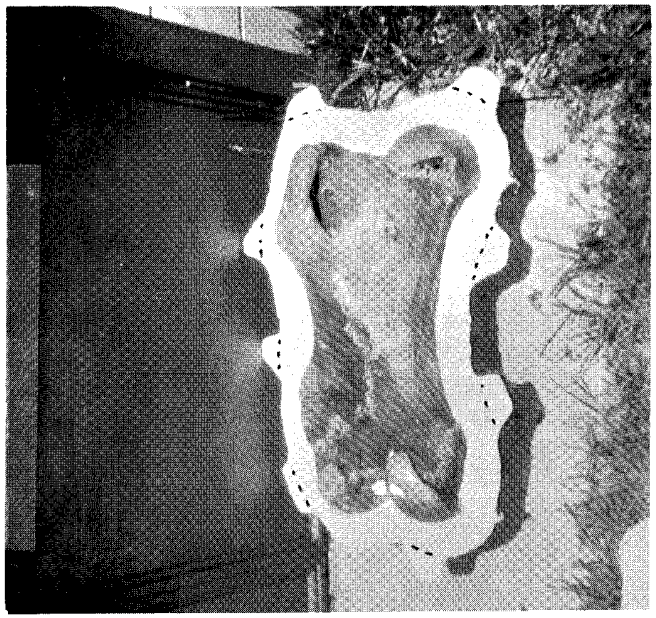
   It is squeezed through a funnel made from a folded and stapled newspaper. Once the edges are coated, the mold parts are placed together and clamped with vice grips. The thickened gelcoat is allowed to cure. By watching the excess squeezed from the mold one can judge when it has hardened. This usually takes 20-30 minutes. Then the overmold is unbolted, and the clamps, the overmold, and latex mold are removed from the cast. The seam formed at the latex contact points can then be trimmed.

DISCUSSION

For fossil teeth within a specimen I use R.T.V. silicone rubber because the results are very dependable. However, this material is used sparingly because it is very expensive.

For cheese-cloth I use 4" x 4" pads. I dip them in latex and squeeze away the excess with two fingers and then apply this bandage to the mold. Be sure to overlap the pieces.





Left: Completed half latex mold and fiberglass overmold with original specimen (sloth femur) inside.

Right: Construction of cast with fiberglass matting and hardening compounds.

I use white gelcoat because it is the easiest to paint with an air brush. I spray on the colors with an air brush because the blends and tones are excellent. Acrylic paints can be used first to achieve a base color. Then acrylic tones can be sprayed on to highlight the colors.

I remove the mold seams with a Dremel hand-grinding tool and carve in the obscured fossil pattern.

To fill defects, a small amount of thickened gelcoat (using Aerosil 200) is mixed with catalyst and applied with a spatula. Trim in rubbery stage and grind in hardened stage.

Water-based clay is used as a mold border because it is cheap and is washed easily from the fossil or mold. With this clay shrinkage is a problem, but it can be overcome by putting oil-based clay in the cracks if they occur.

Because weather can be a factor, at a temperature of 75° F I use approximately one (1) tablespoon M.E.K. catalyst per one-half quart resin. The hotter the weather, the less catalyst needed. For colder weather add more catalyst.

The P.V.A. separator is used because it can be washed off the cast with water. I apply it lightly with a regular paint spray gun.

Fiberglass matt is torn as follows before it is applied to the mold: A 4" wide strip is cut. It is then torn down the middle. The resulting pieces have one straight edge which can be placed at the edge of the mold pattern. The pieces are laid so the uneven edges just touch each other to give a pattern of strength but will allow air bubbles to escape. Removal of air bubbles is very important.

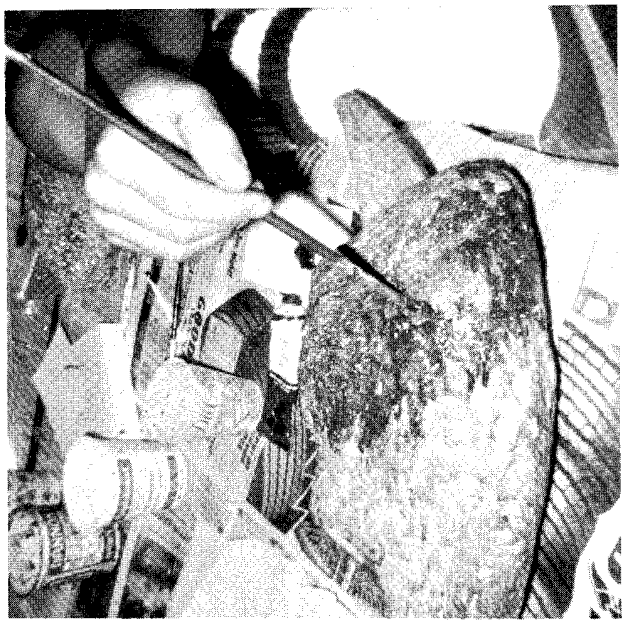
The water-based clay can be rewetted and recycled when sufficiently dry.

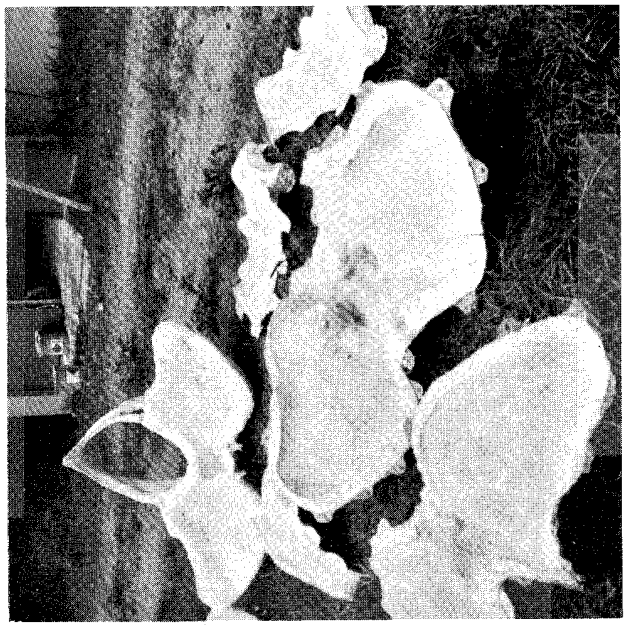
Fiberglass resin is cleaned from hands and brushes with acetone.

I apply wax separator to the fiberglass mold pieces with a sponge and then work it in with a small paint brush.

The clay borders are formed with a spatula and smoothed with a wet sponge before the indentations are pushed into the clay with a small light bulb.

The final layer of latex is smoothed by dipping the paint brush in water and painting over the surface. This allows better separation from the fiberglass overmold.





Left: Mold parts in foreground with completed cast of sloth pelvis in background.

Right: Base coat of acrylic paint being applied to sloth claw before final painting with air brush.

The latex mold can be repaired with latex if torn.

Once you catalyze the resin it must be used rapidly so it doesn't harden before applied.

In summary, this fiberglass process accomplishes the objective of making a hollow cast of any size that is light-weight, strong, durable, and has a surface that shows small details.

Materials and Suppliers:

1. Water based clay	Local ceramic shop.
2. Latex	Robins and Company 130 Stephson Highway Troy, Michigan 48084 (313) 588-1550
3. Plastics and RTV 700 material Separators, brushes, etc.	Bradson Auto-Marine Supply, Inc. Clearwater, Florida 33520 (813) 576-7030