Riv. Mus. civ. Sc. Nat. "E. Caffi" BERGAMO, 22 2003, pp. 69-76 ISSN 0393-8700

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NORIAN FOSSILS CONSERVATIVE RESTORATION EXAMPLES FROM ARGILLITI DI RIVA DI SOLTO AND CALCARE DI ZORZINO (BERGAMO, ITALY)

INTRODUCTION

This poster describes techniques, tools and chemical products used to restore and preserve fossils in conformity with principles of "Carta del restauro dei fossili" (Borselli & al., 1998). All demonstrative examples are Triassic paleontological specimens collected in Bergamo area preserved on rocks and prepared in the 1970s. Now they are stored in the Museo Civico di Scienze Naturali "E. Caffi" of Bergamo. During the periodic check up, we examined conditions of the fossils and their matrix. The preservation state and the problems related to every specimen are carefully analyzed in our laboratory. Analytical procedures, tools and products, registered in the old restoration cards, were updated when necessary. Few problems were encountered and categorized in two groups as illustrated here.

Birgeria acuminata (MCSNB 4850)

The specimen was collected from the main fossiliferous layer of the "fossil quarry" in the locality of Cene, Seriana Valley, Bergamo. M. Malzanni and D. Radici are originators of the specimen in 1972, in the Calcare di Zorzino" a Middle-Upper Norian formation. This fossil fish is important because it is complete, with tail-head length of about 45 cm. The major part of the fossil is in lateral view, but the skull is in dorsal view. The main reason of re-treatment of this specimen is due to the weakness of the matrix in some parts. These areas have been consolidated but due to their differences in composition (calcareous-marly) still show dishomogenities. These rock variations are highly sensitive to natural processes of degradation. However, this specimen was prepared for research and scientific studies not for display in the museum.

BEFORE RESTORATION. The fossil was cleaned in all the skeletal parts and the bone structure has good prominence (Fig. 1). The preliminary analysis revealed some problems which needed to be solved in order to have a complete preparation. Many stains of vynil glue on the matrix represent areas of consolidation by injections done previously. This operation was done to stop the degradation located in small areas of the slab. Verifying preservation of the matrix close to the fossil, we found-out areas, that, still show an early stage of disagregation outlined by the microfractures (joints), although consolidated in a skillfull way. A further consolidation with the vynil glue

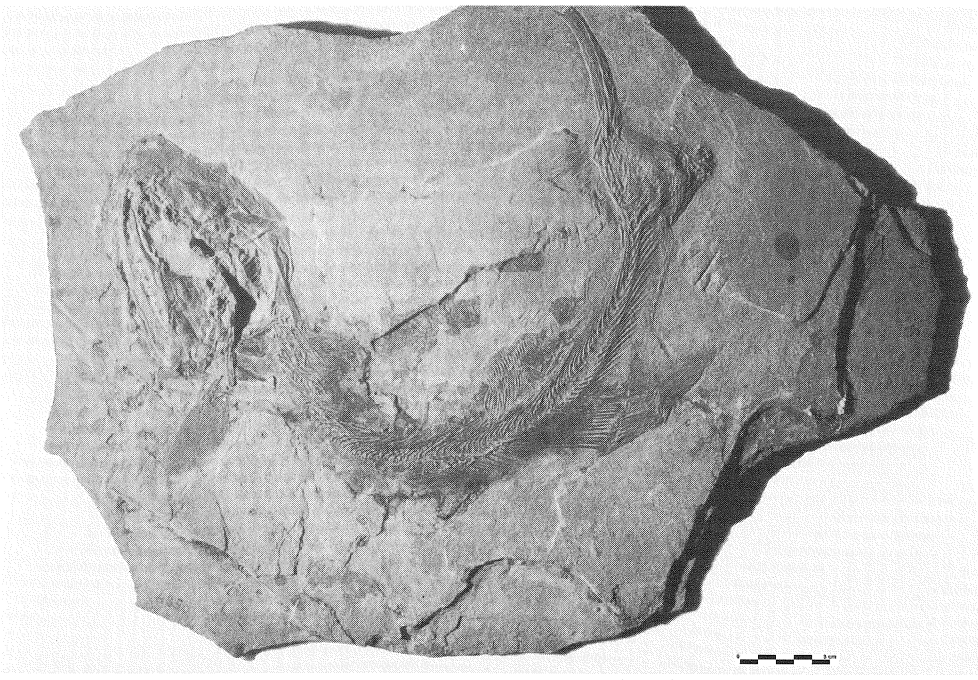

Fig. 1: *Birgeria acuminata* (MCSNB 4850) before restoration.

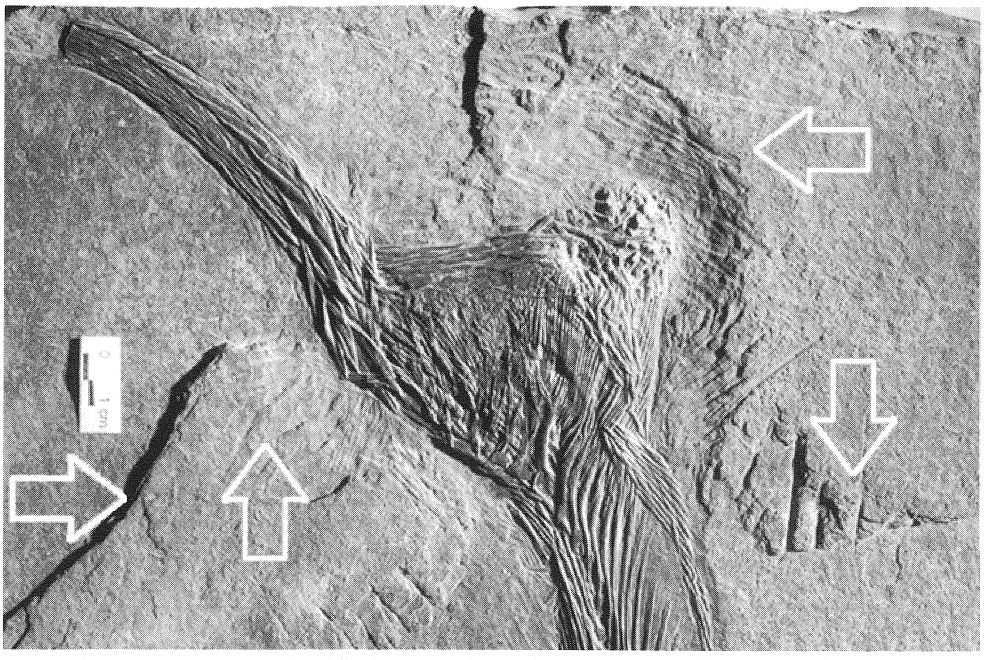

Fig. 2: Tail details (MCSNB 4850). Deep cuts around the tail and rock steps on the bed layer.

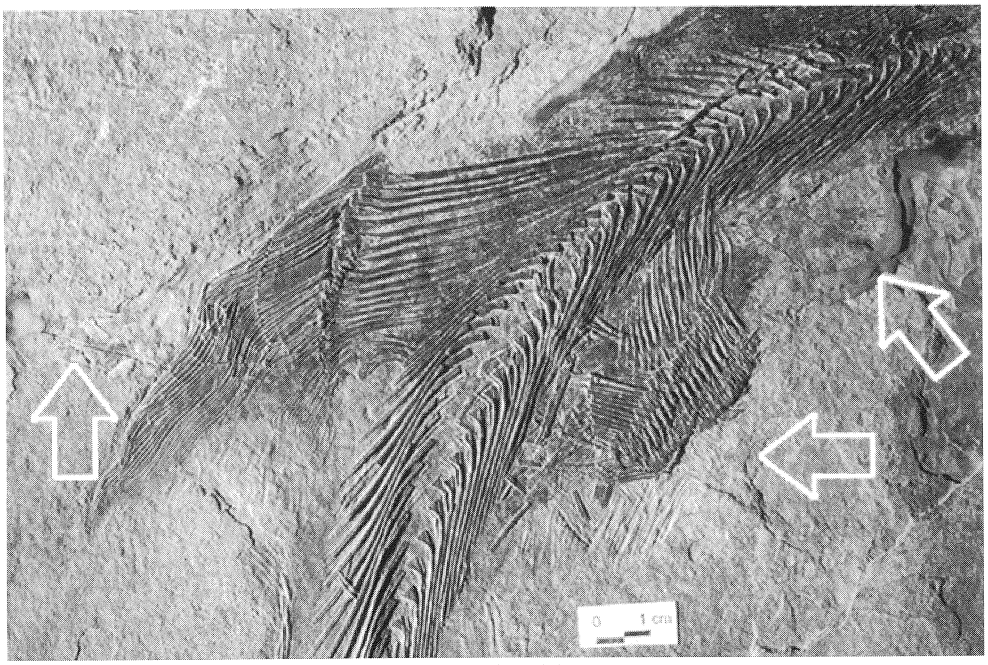

Fig. 3: Ventral details (MCSNB 4850). Chisel cuts are on the matrix, some joints and the mixture of glue and powdered rock.

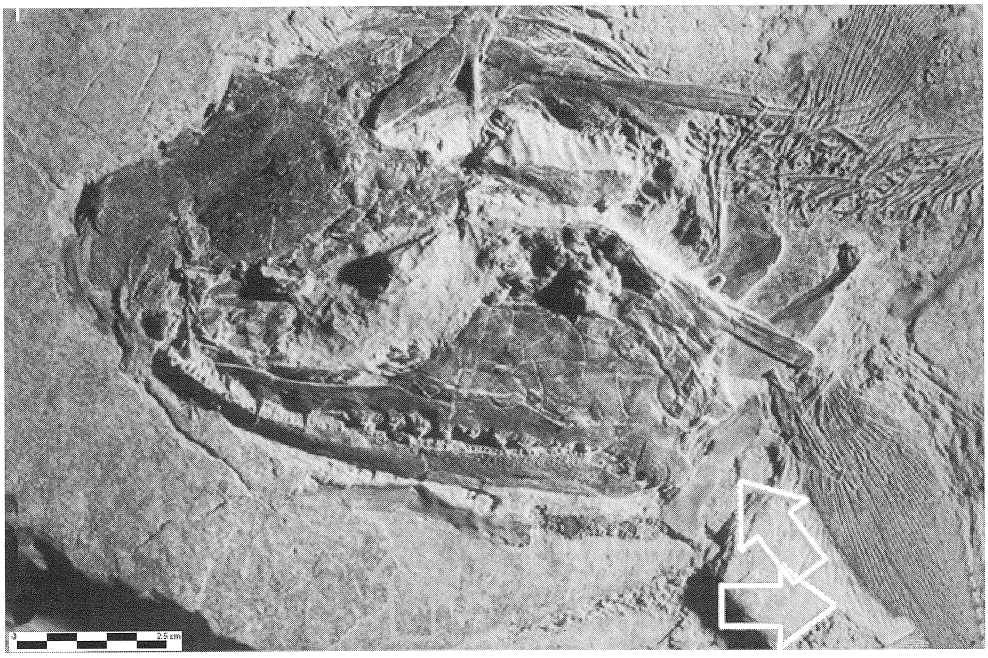

Fig. 4: Skull and fins details (MCSNB 4850). See the chisel cuts around the fins and in front of the skull. The mixture of glue and powdered rock under the jaw is evident.

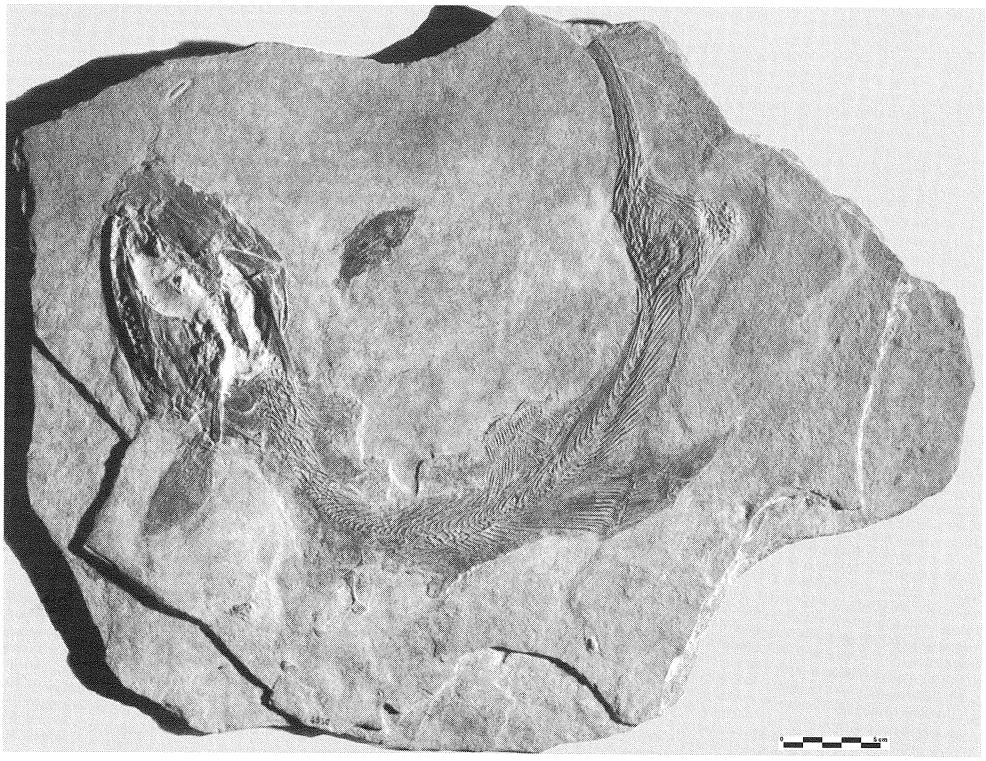

Fig. 5: After restoration (MCSNB 4850). Near Birgeria skull a small fish was discovered during the preliminary phase of matrix cleaning and preparation.

was needed, especially close to the fossil. When necessary a partial removal of the rock was carried-out without compromising neither the fossil nor the structure of the matrix. The previous consolidation consisted of mixtures of glue and rock powder applied on the degraded areas of the matrix. The chisel cuts visible on the edge of the specimen (Fig. 2, Fig. 3 and Fig. 4) were formed during opening of the fossiliferous layers.
Small chisel cuts on the matrix and dirty stains were formed during the previous rough-cleaning of the fossil. Matrix structure at the back side was good, but due to the thickness of the slab (8 mm), we reinforced the support.

AFTER RESTORATION First step: consolidation of the specimen by injecting into all soft matrix layers and joints.Second step: removal of spot and chisel cuts from the matrix by steel needle or lancet by soft mechanical abrasion.Third step: removal of the deep stone chisel cuts and the thick rock scale by a small pneumatic drill.Matrix degraded and remote from fossil sides have been removed. During these operation another small fish and a little coprolite near the skull were discovered (Fig. 5).The lithological differences (gray limestone, brown shale) that are the main cause of specimen degradation, can be now appreciated, due to our cleaning operations.

Fig. 6: *Glaessnericaris macrochela* (MCSNB 4202) before restoration.

Glaessnericaris macrochela (MCSNB 4202)

The specimen was discovered in the fossiliferous locality of Val Brunone near Ponte Giurino village (Imagna Valley, Berbenno, Bergamo). This fossil was collected by M. Gervasutti in the 1970s from a small outcrop of the Argilliti di Riva di Solto an Upper Norian formation. This crustacean fossil is a holotype in which Garassino and Teruzzi (1993) described a new genus and a new species. It is about 10 cm long and shows a typical large chelae in the first pair of pereiopods. Matrix restoring of this specimen is due to dehydratation of the thinly stratified shaly marls and shales. The degradation of the rock caused two parallel pervasive joints which weakened the stuctural stability of the specimen. The old technique used to stabilize the jointed plate was by sticking two slabs with glue in the rear part. Dehydratation and exfoliation of the rock caused failure of the glue in keeping the specimen joined.

BEFORE RESTORATION.Removal of the chisel marks and rock cover from the fossil were the first operation on the frontal part (Fig. 6). The specimen was completely re-consolidated and the fossil was cleaned in order to be classified. Mixtures of glue and powdered rock were applied to mask rock steps or missing parts. These points and the surface of the matrix were cleaned with sand-paper. Two rock plates were glued at the back of the specimen transversal to traces of the joints to stabilize the thin (3 mm) matrix of the specimen (Fig. 7).

AFTER RESTORATION Periodical check-ups, showed that superficial joints had evolved

Fig. 7: Starting point. Back of specimen with old method of preparation. See the two rock plates with glue on the whole surface.

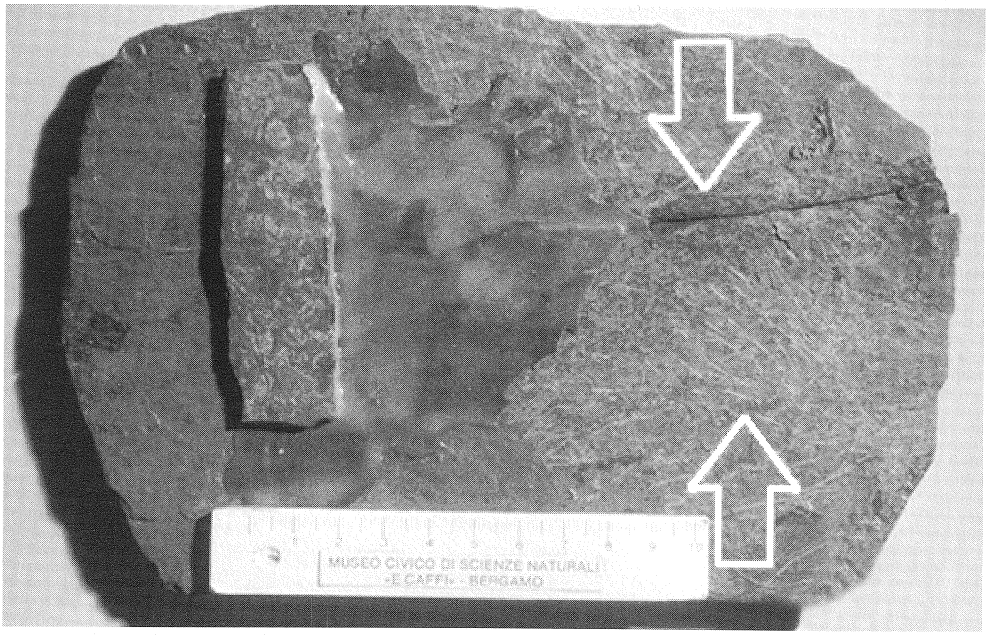

Fig. 8: First step. Removal of the right side plate. Pervasive joint clearly appears on the right side under the removed glue.

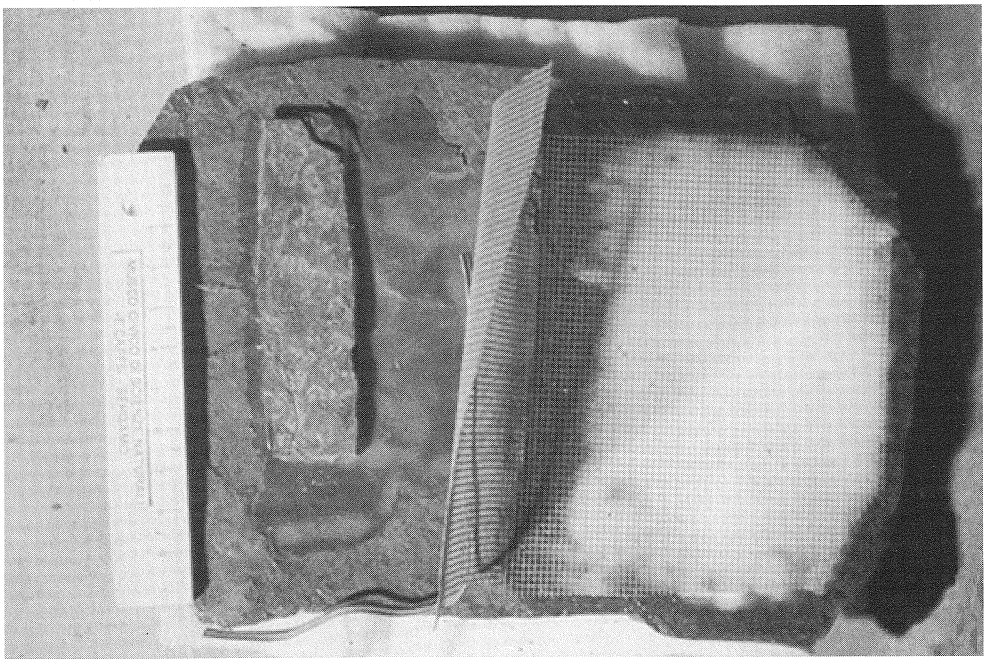

Fig. 9: First consolidation phase. A plastic grid is glued on the prepared surface.

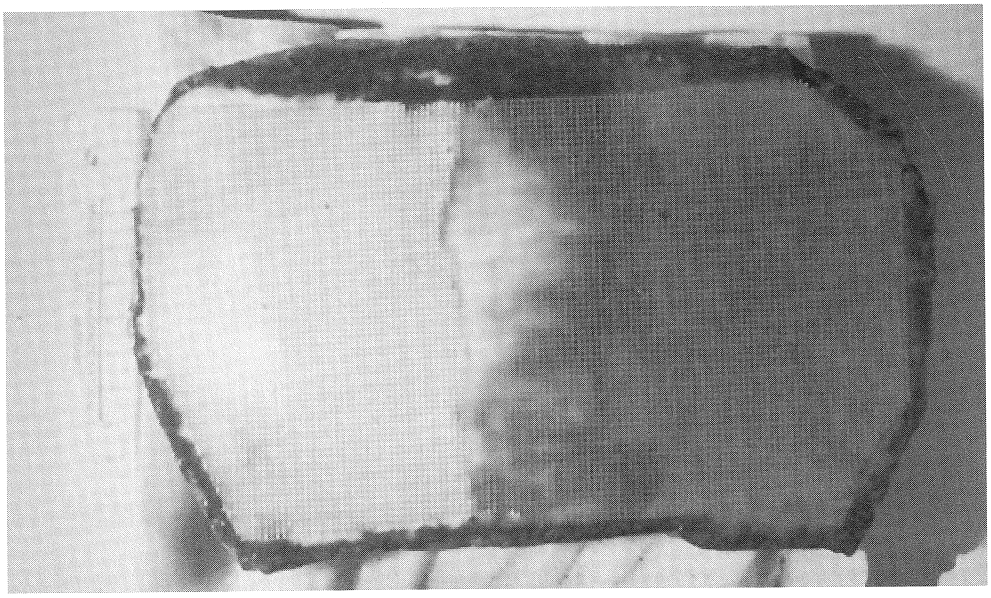

Fig. 10: Second consolidation phase. Right side dry glue. Left side wet glue.

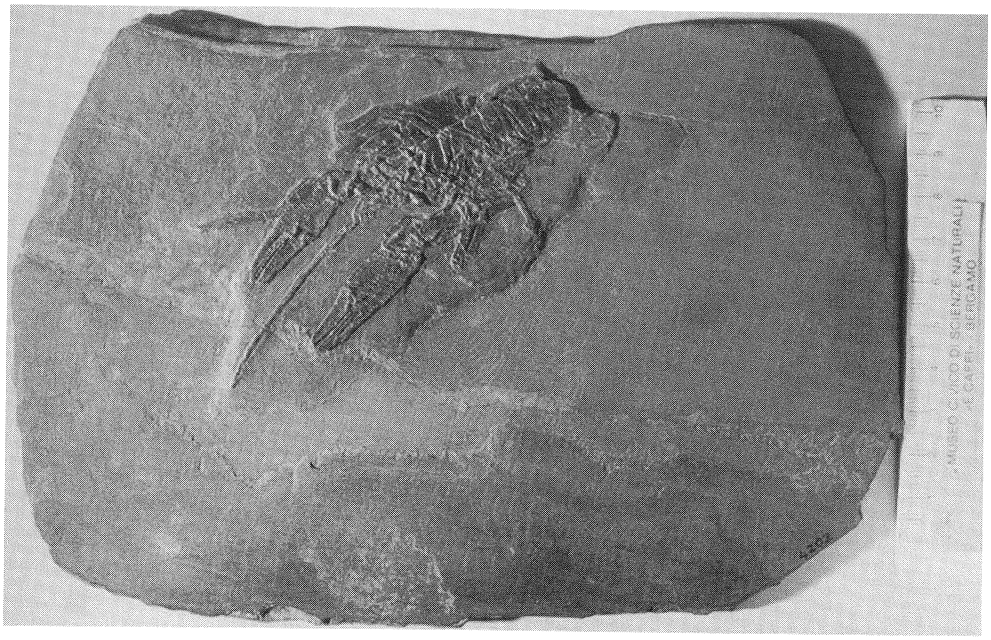

Fig. 11: After restoration. MCSNB 4202

into pervasive joints in the whole specimen. Problems were traced-out by consulting restoration cards and old photos. Based on chemical and mechanical tests on rock slabs similar to our specimens, we choosed the proper materials. First of all, we consolidated fossil and matrix reducing the structural sinking by injection of vinyl glue into pervasive joints on the frontal part of the specimen. Then we removed the old plates and the glue from the rear side with a micro-pneumatic drill. We replaced the plates with a reinforcing grid adherent to the matrix (Figg. 7/10). Fragility of the specimen was reduced cleaning the fossil from glue-arabic and covering matrix. We used a lancet/steel needle to remove matrix and/or glue close to the fossil. A small pneumatic drill was used to remove degraded and unnecessary materials. All operations of this specimen (Fig. 11) were done by a microscope with a cold light source.

REFERENCES

GARASSINO A. & TERUZZI G., 1993 – A new Decapod crustacean assemblage from the Upper Triassic of Lombardy (N- Italy). Soc. It. Sc. Nat., Milano, Nuova Serie, Vol.1.

BORSELLI V., CONFORTINI F., DAL SASSO C., MALZANNI M., MUSCIO G., PAGANONI A., SIMONETTO L., TERUZZI G., 1998 - Carta del restauro dei fossili. Museologia Scientifica 15 (2): 215-226, 1998 (1999).

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