

# PALEONTOLOGICAL SURVEY OF THE JURASSIC MORRISON FORMATION IN DINOSAUR NATIONAL MONUMENT

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## ♦ EXECUTIVE SUMMARY

This project was undertaken to survey the surface exposures of the Jurassic Morrison Formation within Dinosaur National Monument (DNM) for fossil occurrences of any sort. The primary purpose of this survey is to provide an assessment of the extent and characteristics of the paleontological resource in this geologic formation within DNM. In so doing, the survey may also have the effect of discovering specimens of obvious and immediate scientific importance and providing observations that will contribute to an improved understanding of the stratigraphy of the Morrison Formation.

Dinosaur National Monument was originally established for, and takes its name from the unique occurrence of a quarry (the Carnegie Quarry (CQ) that has produced a diverse and abundant dinosaur fauna. The CQ occurs within the Morrison Formation which is known worldwide as one of the most prolific dinosaur-bearing units in the paleontologic record (Colbert 1968). In addition to the dinosaurs, the Morrison has produced the best-represented fauna of early mammals from the Jurassic (Clemens et al. 1979) and fossils of other vertebrates (Chure & Engelmann 1989).

This suggests that the area beyond the CQ at DNM may contain important paleontological resources. This project will provide the first

systematic survey of the Morrison Formation within DNM. It will provide a basis for management of the paleontologic resource in the future and is likely to yield immediate results in the discovery of specimens that can be important to ongoing research projects.

## ♦ METHODS

The methods employed are standard paleontological field practice. A field assistant and I walk over the outcrop area in a systematic pattern that allows us to visually inspect the surface at close range. When fossil material is observed at the surface, the site is examined more closely to determine the nature of the occurrence, whether the specimens are in place, the quality of preservation, the identity of the specimen(s) and any other pertinent observations. All observations are recorded in field notes. Shallow excavations are sometimes made in order to assess the site more accurately, although the objective is not to completely expose the specimen nor to collect it in most instances.

Occasionally specimens are collected if loss or destruction of a scientifically valuable specimen is imminent or if the specimen can be used in a currently active research project. All specimens collected are cataloged into the collections at DNM.

In addition to field notes, all sites are documented in the field by recording a description of characteristics and location of the site for later entry into the computerized locality file system at DNM, the location is plotted on enlarged sections of topographic maps and B&W print photographs on which the exact location can be plotted later are made.

Information pertinent to the stratigraphic research project being conducted in DNM is shared with the investigators of that project and our work is guided by their findings. This is especially true in the selection of samples for palynological analysis and radiometric dating which will be done cooperatively by both projects.

#### ◆ PRELIMINARY RESULTS

In the first two years of a 3-year project, we have inspected perhaps 80% of the total area to be covered. I anticipate that this rate of work will permit us to cover the entire area within the period of the project, and I believe we are covering the area very thoroughly.

In terms of the discovery and documentation of fossil localities, we have obtained very good results. We have recorded more than 270 sites, of which less than a quarter were previously known in DNM records. The overwhelming majority of these sites are dinosaur bone localities. Most occurrences of dinosaur bone are of fragmentary material not obviously of great scientific significance. However, many sites could prove to be of some scientific value with further investigation, and several sites are clearly important even given only the limited information provided by our field study. For example, articulated remains of part of the skeleton of a theropod dinosaur were found at one site.

Silicified logs were relatively common, particularly in some horizons, and some other plant remains, including a cone-like structure, were found at a few sites. Invertebrate fossils and trace fossils were also documented. In addition, a few sites have the potential to yield microvertebrates if developed further. Many horizons that may contain palynomorphs have been located and sampled as have many bentonite layers which may be suitable for radiometric dating.

Except at Deerlodge Park, where we observed evidence of systematic prospecting of the outcrops, we saw little evidence of illegal collecting, and only a short distance away from areas heavily used by visitors, specimens seemed to be relatively undisturbed.

#### ◆ INTERPRETATION

With more than half of the survey completed, it is clear that fossils are present throughout the Salt Wash and Brushy Basin members of the Morrison wherever these units are well exposed, and even where they are but poorly exposed. The paleontological resource is rich, but there are few sites where the potential for a scientifically significant specimen is obvious from surface indications. In many cases, one can only distinguish between fragmentary, unidentifiable bone and well preserved skeletal elements by careful excavation. Similarly, microvertebrate sites may have no surface indications at all. Over the long term it would probably be worthwhile to further investigate the majority of the sites recorded by this survey.

#### ◆ LITERATURE CITED

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