

Recovering Old Excavation Sites Using Aerial Photographs and Topographic Maps

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Introduction

The lab has a collection of aerial photographs of Dinosaur Provincial Park taken in the 1970's, which include fossil sites, but no coordinates.

By transferring the positions of the sites to larger topography maps, we were able to determine the exact coordinates of the locations. This can then be inputted into handheld GPS units to find the sites in the field. If the site represents a new find, or a previously excavated area, the data can be used in further studies.

Purpose

In the past, researchers have used coordinates of quarries and bone beds to rediscover, excavate the sites, and collect additional information. This can also be used in reverse, to determine whether mystery quarries in the field were the source of specimens that are marked on the aerial photos.

The coordinates we determine will enable future field workers to save time by locating these sites, allowing for the potential of revolutionary discoveries, and the collection of additional data (such as altitude and possible association with certain types of rock) for research.

This work will also continue some of the work of previous researchers, such as George F. Sternberg's research in the 1920's.



Figure 1. Example of a site location and it's quarry plate. (Q97 is not marked on this map)



Photos supplied by Philip J. Currie

Methods

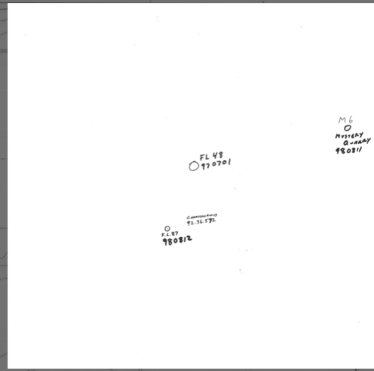


Figure 2. Back of aerial photograph #116 taken in 1977 with the location and name of sites discovered by previous researchers.



Figure 3. Part of the topographic map which matches up to the aerial photograph.

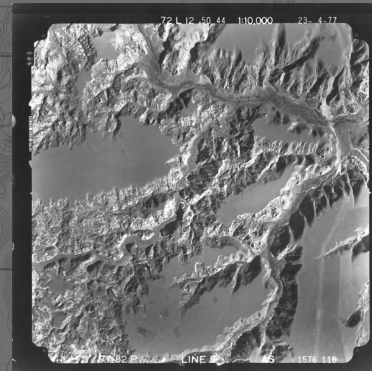


Figure 4. Front of aerial photograph #116 taken in 1977.

From the locations on the back of the aerial photographs, we were able to locate the positions on the front of the photograph, by feeling for the slight bulge of the pin prick made by the researchers who discovered the site.

As the scale of both the aerial photograph and the topographic maps are 1:10000, we were able to slide the photograph underneath the Mylar map, and locate the site by matching up distinct landmarks.

We are now able to input our coordinates into Google Earth for other researchers and paleontologists to have access to the exact location of these sites.

39	115	115 Field Checked 960811	12U 0460261 9621424
39		BB87a	12U 0460506 9621425
39		BB87b	12U 0460500 9621443
39		FL 105 990813	12U 0460170 9621468
39		109 990811	12U 0460061 9621640
39		Q110 990811	12U 0460736 9621646
39		UA049 990811 Hadrosaur	12U 0460842 9621674
39		84 Corrected 990811	12U 0460039 9621335
39		101 990811	12U 0460348 9621056
39		49 990812	12U 0460162 9620480
39		UA048 UA049	12U 0460586 9620330
39		141	12U 0460222 9620156
39		L25 Labyrinthus	12U 0460162 9620396
39		Hadrosaur UA050	12U 0460233 9620130
39		Q190 UA06 86	12U 0460219 9620341
39		Skull Cap Linda Strong P 80, 16, 8284	12U 0460080 9620110
39		116 FL48 970701	12U 0461400 9620824
39		M8 Mystery Quarry 970701	12U 0460341 9621075
39		Charaxesaurus 92/38, 872	12U 0461450 9620326
39		FL87 960812	12U 0461570 9620390
39		117 Fossil Local 5	12U 0462811 9621046
39		UA037	12U 0462118 9621115
39		Unmarked Quarry (old with wood)	12U 0462736 9620834
39		BB139	12U 0462840 9621013
39		Fossil Local E Albertosau In BB129	12U 0462778 9620936
39		Skull-Centrosaurus Aug 1984-Q217	12U 0462880 9620903
39		118 Weyli's UA296* Hadrosau July 92	12U 0461185 9621515
39		113 Field Checked 1992	12U 0461130 9621378
39		118 Field Checked 1992	12U 0461436 9621234

Table 1. The coordinates which were determined using WGS84 (World Geometric System 1994)

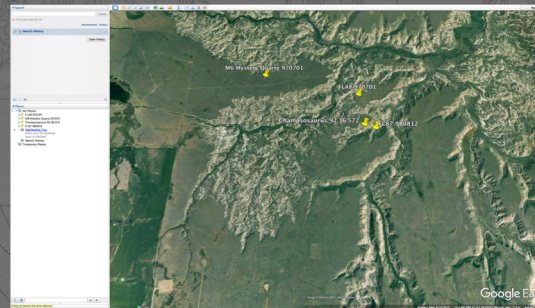


Figure 5. The points from map #116 as seen using Google Earth

Results

These techniques allow for the rediscovery of sites in the field where fossils have been previously found. The recovery of additional data and fossils will aid in the classification of already discovered dinosaurs, and provide information on their associated environments to further explore their evolution, ecology, behaviour, and other aspects of their biology.

As many of the sites have already been located, we were able to compare our coordinates with those determined by researchers who were previously in the field with a GPS. This enables us to visualize how similar our results are.

As we were typically a couple hundred meters off, possible areas of error occurred when lining up the photographs with the topographic maps, and while placing the pin pricks onto the map. There is also some distortion in the photographs due to the curvature of the camera lens.

Conclusions

While many of the main bone beds and quarries on the aerial photographs have already been located and excavated, our hope is that the other sites which were left behind can be relocated. The data determined from these sites can be later used for research.

Acknowledgments

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