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RESTORATION OF A LOST GEOLOGICAL REFERENCE POINT: THE LOGGINGSTONE OF PEDRALTA (GIRONA, SPAIN)

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ABSTRACT

The Pedralta is a loggingstone formed of monzonitic leucogranites, which has a volume of about 38 m^3 and weighs 101 tons. After its fall in December 1996, a public subscription was opened to meet the expenses of the restoration work, which was completed in May 1999.

Key words: *restoration of Ceological Heritage, loggingstone, Pedralta.*

Introduction

The Pedralta is undoubtedly the most emblematic feature of the geological heritage of Girona (Pallí & Roqué, 1997a). It is well-known and visited daily by a lot of people; a large popular meeting is held beside it every year. It is a very large loggingstone, the biggest in the Iberian Peninsula. The people who visit it have the custom of placing a glass bottle under the swaying block. Then they make the rock move by pushing it with their hands and the bottle breaks, crushed by the enormous weight of the rock. On 10 December *1996* the swaying block fell due to a combination of natural and human phenomena (Amat, 1997; Pallí & Roqué, 1997a, 1997b). At once, local people initiated an open public subscription to pay the expenses of putting the rock back in place, which in total cost 5 million pesetas. After two stages of work, the restoration of the Pedralta was completed in the early morning of 26 May 1999.

Location

The Pedralta is in the Montclar massif, a small mountain system which is part of the Ardenya massif, within the Selva Marítima range. It is about 295 m a.s.l., at the top of a narrow, dominant level stretch. Its exact position is, according to UTM coordinates, *2°* 59' 00" East and 41º 47' 34" North. From ancient times it has served as a boundary stone, and still today marks the limit between the towns of Santa Cristina d'Aro and Sant Feliu de Guíxols.

Geological and geomorphological characteristics

The Pedralta is a rock of biotitic monzonitic leucogranite, moderately thick-grained and pink in colour. Its density is 2.63 gr/cm^3. This outcropping material is affected

by a dense network of diaclastic joints, which parallelepipedic blocks, measuring from a decimetre to a metre, sub-divide. The main directions of dipping in the planes of fracture are 315/80, 070/50 and 020/15.

The original form of the Pedralta, before its fall and restoration, was characteristic of a loggingstone (Fairbridge, 1968; Twidale, 1982). As such, it was a block which, situated on top of a tor, was in a position of unstable equilibrium, so that it moved to and fro at the slightest touch of the hands.

The grouping of blocks on which the swaying rock was balanced make up a tor 8 m long and 5.5 m wide. Its maximum height, on the West, is 10 m. The east side is 7 m high.

The fallen upper stone, seen from below, has a shape similar to a right-angled triangle with the most acute angle truncated. The three main sides measure 6.2, 5.5 and 3.5 m, while the truncated section is 1.6 m. The height of the block varies between 3.4 and 2.3 m. Its approximate volume is 38 m^3. Its weight; taken during the restoration work, is 101 tons. The form of this block is determined by the system of joints dividing it. The design of the network of fractures observable in the high part of the tor does not coincide, however, with the layout of the joints in the top block such as it was positioned when it swayed, before its fall. Nevertheless, there would be perfect coincidence between the joints of the tor and those of the top block, if the block were situated a little bit further East (Fig. 1 a, 1 b). This allows us to affirm that the swaying stone of Pedralta shifted to the West, remained partially hanging and acquired the ability to sway (Pallí & Roqué, 1997b).

The fall

The fall of the top stone took place on 10 December 1996, during a fierce storm with wind and rain. It stopped 15 m from the base of the tor, at about 90^2 from its original angle and leaning some 15^2 towards the South.

Figure 1. Diagram of the different positions that the upper stone of the Pedralta (coloured grey) has had on top of the tor: a) initial position, before being able to sway; b) position it had when it could sway; c) present state, not able to move, after being repositioned.

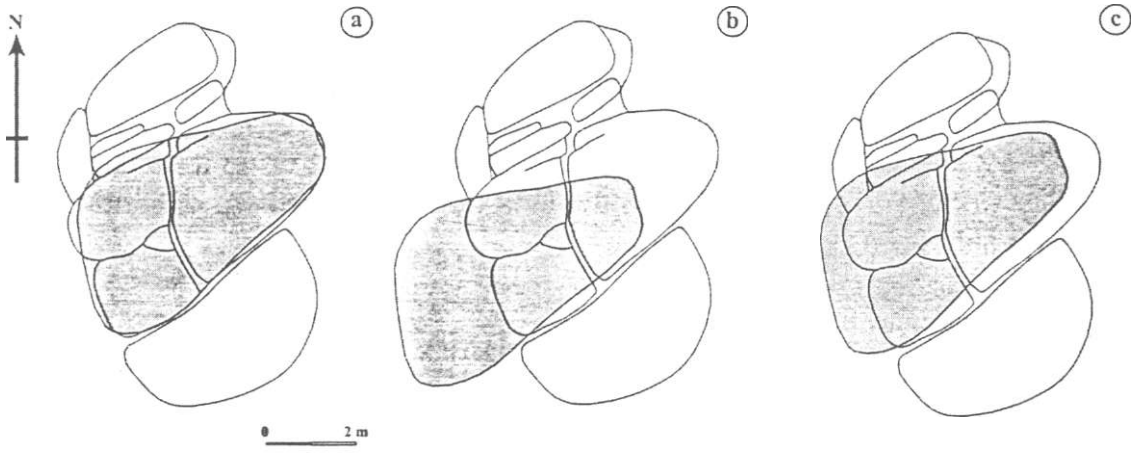


Photo 1. The loggingstone of the Pedralta before the fall of the top stone.

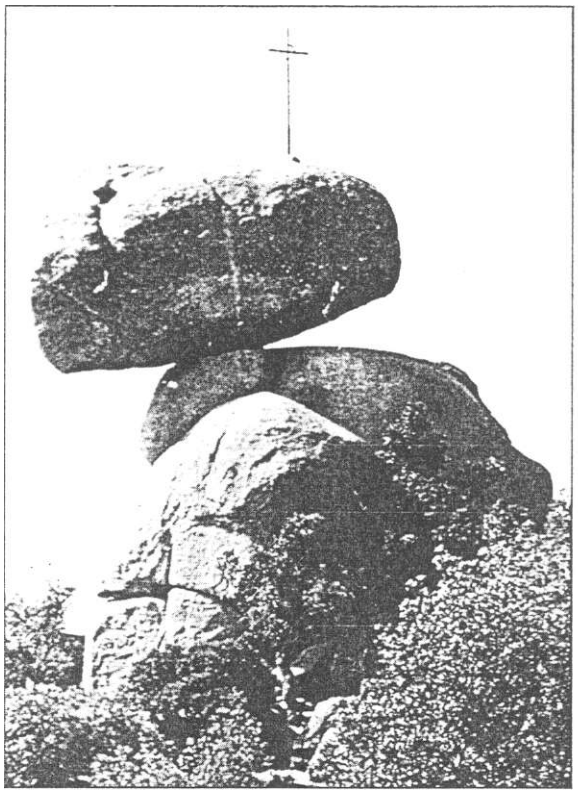
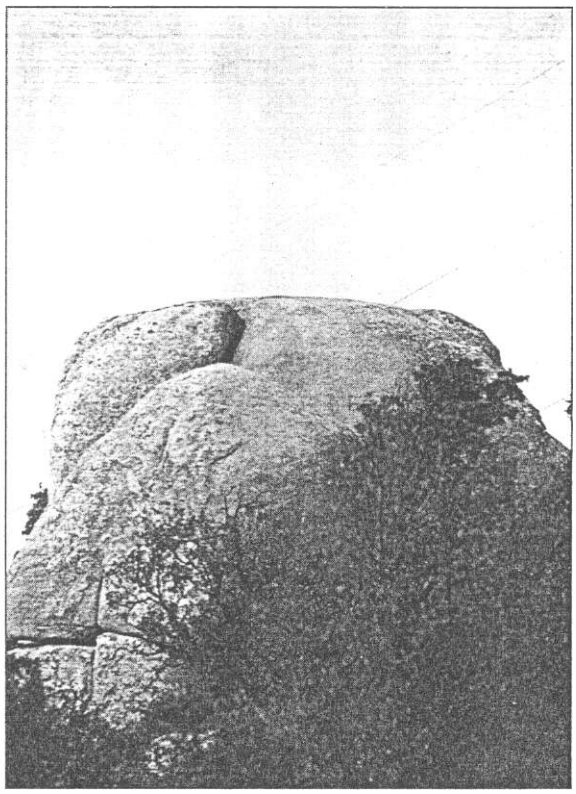


Photo 2. Pedralta after the fall of the top stone in December 1996.



The exact causes of its fall are unknown. It needs to be borne in mind that the existence of a loggingstone is almost fortuitous, since these shapes are very ephemeral in the geological scale of time (Pedraza *et ai,* 1989). Therefore, the fall of the top stone of the Pedralta has to be understood as a natural part of its geomorphological evolution. Notwithstanding, the most reasonable explanations coincide in that its fall was brought about by human intervention (Amat, 1997; Pallí & Roqué, 1997a, 1997b). Concretely, the asymmetrical accumulation of glass fragments under the rock caused an erosion, also asymmetrical, of its base. This, along with the fall of a small triangular block of rock, mechanically very deteriorated, took the centre of gravity of the swaying stone to the limit of its stability. Then one final movement caused it to fall.

The repositioning

The idea of placing the swaying stone back on its original site arose practically as soon as its fall was known. The repositioning project was worked out by the engineer J.Amat, and was developed in two phases. The first was carried out on 3 June 1998. After the access track and the immediate surroundings of the Pedralta had been prepared, two huge cranes together lifted the fallen rock and placed it just under the tor. The stone was turned 90^{s} to reveal its base, with the aim of studying it and determining the best way of placing it back on top of the tor so that it would still sway. The second phase was begun on 24 May 1999. Again two huge cranes initiated the manoeuvre of lifting the rock. However, problems of stability in one of the cranes

Photo 3. The loggingstone of the Pedralta after the restoration of the top stone.

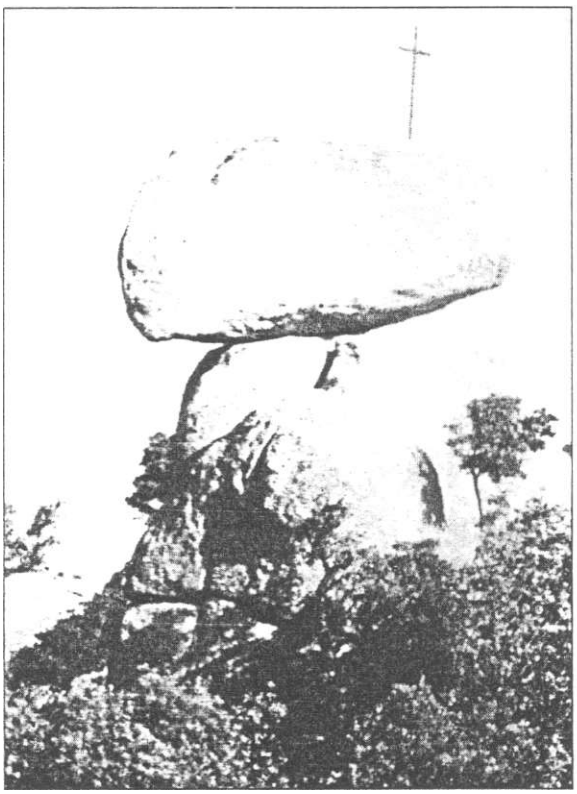
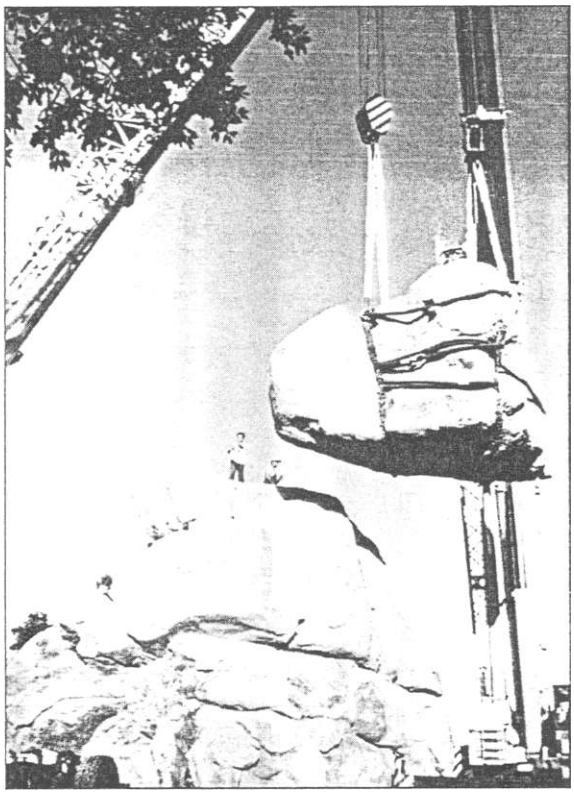


Photo 4. The works of restoration of the Pedralta on 25 May 1999.



aborted the operation. Work could not be re-started until the following day, which was prolonged until the early morning of the 26th, when the rock was finally placed on top of the tor.

The final position of the rock differs markedly from before: it has been displaced 1.2 m to the North and 1 m to the East (Fig. 1 c). This has brought about two important modifications: it hardly overhangs the west wall of the tor and, much more importantly, it no longer sways.

Summary and conclusions

The case of the Pedralta is an example of the loss of an element of our Geological Heritage due to human intervention. The restoration of the rock was motivated more by reasons linked to the leisure and cultural activities developed around it than because of its geo-cultural value. In any case, the repositioning of the stone has brought about a substantial change in its morphological features, to the extent that it has lost its ability to sway, undoubtedly the most particular feature of this rock.

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