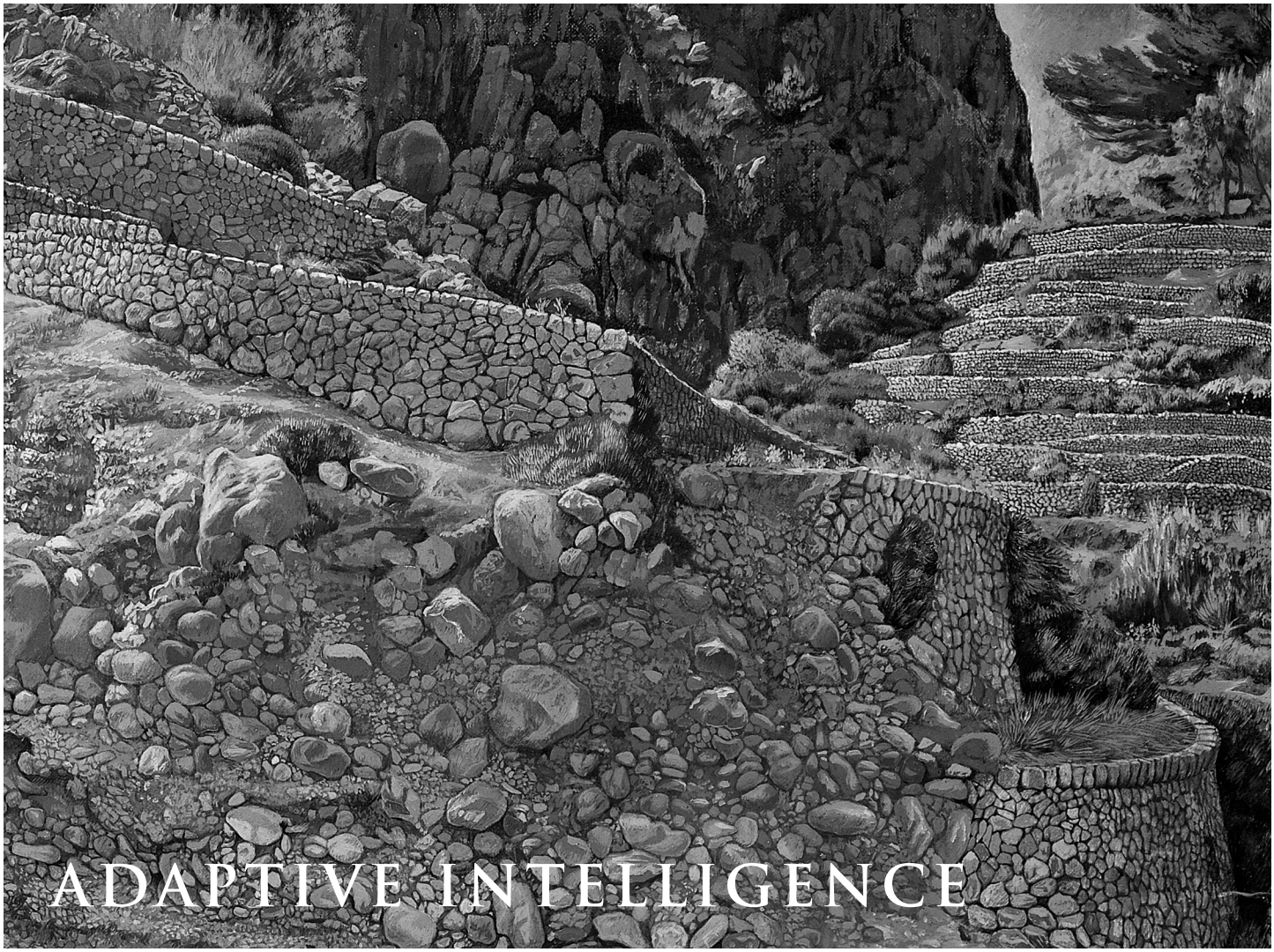

ADAPTIVE INTELLIGENCE

DRY STONE WALLS OF MALLORCA

by Miguel Ramis

Mallorca is the largest island (1,405 square miles, slightly larger than Rhode Island) of the Balearic archipelago. Due to its strategic location in the western Mediterranean it has been densely populated throughout its long and colorful history. The successful agriculture-based economy that evolved there made territory an important cultural issue.

The flatlands were obviously the most desirable areas and these were possessed by the most important families, the descendants of the noblemen with King James I who defeated the Moors and took control of the island in 1229.

The forests were slowly transformed into cultivated land by the landed gentry and the religious orders, especially the very organized Cistercians. Trees were cut, water channels, mills and cisterns built and the forests physically adapted to suit economic ends. The mountainous areas, with hardly any soil, remained wild. The poor people, called *roters*, (ro-TAIRS) started to establish agreements with the landlords: for the right to inhabit and cultivate a section of hilly terrain they would give the landlord half of what they were able to make the land produce—the practice known elsewhere as sharecropping. The wealthy landlords had nothing to lose, and the poorest people had the opportunity to make a living.

Thus, the hills began to change. Retaining walls, called *marges*, tamed the stony landscape step by built step. Erosion was checked and the soil was held in cultivable terraces on which crops like olives, grapes and onions were grown, produce that had been exported since Roman times. The Sierra Tramuntana is a mountain range in the northwest quadrant of the island; in this area alone over 10,000 linear miles of *marges* were built over time.

After generations of hardscrabble life the most resourceful and hard working *roters* had been able to earn the means to buy the land and the territory started to change from large estates to small farms or *fincas*. Social revolution was the by-product of the transformation of the natural landscape.

Once the erosion was controlled, agriculture in the mountains became possible. Vineyards, olive trees and other plants brought a green carpet to the mountains. Greenery attracts rain, and rain abets the development of a successful agricultural economy.

The dry walls are a home for many creatures: snakes, insects, and especially *caracoles*, or snails, which were an important source of protein in the meager diet of the poor folk and are a delicacy still in Mediterranean cuisine.

The last decades have witnessed an increasing trend for tight stone fitting. This was never traditional in the past. It is nothing a *marger* could not do, but simply illogical in terms of efficiency. Furthermore, smaller joints mean the snails would not be able to house in the *marges*, thus blocking the possibility of gathering them.

To clarify, we are talking here about countryside agricultural terrace walls. There are tight fitting walls dating from 19th century, civil works, such as the roadway walls ordered by Queen Isabel II. These civil works started a trend towards tight fitting that is basically urban.

THE EVOLUTION OF SKILL

Agriculture has always been the proving ground of the art of the stonemason. The ingrained habit of using stone to build non-mortared walls evolved into a traditional building art form, the principles and aesthetics of which were passed from generation to generation of craftsmen capable of conceiving of and executing more demanding and technical stonemasonry designs such as roadways, bridges, water channels and reservoirs, flooring, pavements and, ultimately, sculpture.

DISTINCT FEATURES OF A MALLORCAN WALL

Dry Stone Walls, Polygonality and Arches

In general Mallorcan walls, are comprised of pentagonal and/or hexagonal shaped stones. In rural walls stones are usually placed in the wall as they are found, with little or no shaping, so they tend to be only rudimentary pentagons or hexagons. In more urban or formal settings the stones tend to be tailored polygonal shapes.

As indicated in the detail of the photograph of Mestre Biel and as can be seen in the other photographs, the Mallorcan *marge* is a complex mesh of many interwoven arches. In a well-built *marge*, most stones are surmounted by an irregular arch of other stones—and are themselves elements in one or more other arches.

With rectangular coursed stonemasonry, if a stone is taken out of the wall, a natural corbelled arch is formed by the stones in the courses above it. With polygonal masonry, what you get is a true arch formed by 3 or more stones. The wall would not even notice the missing stone since the arch will be in tension. Because the ground under a wall tends to subside here and there over time, especially after heavy rains, the arches embodied in the wall enter into tension. Hence a polygonal wall can withstand these movements better than a rectilinear wall due to its inherent tensile strength.

A scene from the Stone Foundation's dry stone walling workshop last summer in the village of Deia, Mallorca: Mestre (master) Biel Estela, 76 years old, is assisted by workshop instructor Lluc Mir as Michel Giannesini works nearby and Donna Hasbrouck looks on. Mestre Biel has been working with stone since he was 13 years old. Building such walls has become second nature with him and he is probably not conscious of the interlocking series of arches that he is incorporating into the structure of this one (see detail). Note the rudimentary but effective Mallorcan scaffolding which can be easily removed and repositioned: two planks resting on two stout pieces of rebar inserted into crevices in the wall (the soda can is a safety measure.)

The arch is one of the strongest and most efficient building forms of all times, so it is no surprise to discover that they are integral to this walling system.

Non-Horizontal Coursed Wall

The stones are placed vertically instead of horizontally. In the event of the foundation sinking, the stones adjust, find new positions, obey gravity, work like wedges; tensile strength is not lost. In a horizontally coursed wall, a subsiding foundation immediately causes a loss of tensile strength that can never be regained.

It is no wonder that in Japan and Peru, areas subject to earthquake, a polygonal wall system evolved. The Mediterranean historically is also a seismic zone, so the technique could well be a universal anti-seismic solution.

Paret en sec versus Paret en verd

In Mallorca there is a clear distinction between the *paret en verd*, a horizontally coursed house wall built with lime and earth mortar, and designed to take top-to-bottom bearing weight, and the *marge*, a dry wall with non-horizontal courses, designed to withstand the lateral pressure of the earthen terrace behind it.

Capginyes

The *capginya* (see photo next page, top) is a vertical column of sizable stones placed at regular intervals within the *marge*. This simple and effective design is, in fact, an integral pilaster or in-built corner that, in the event of a collapse on one side, limits the damage and sustains the other side until the repair is made.