Enchanted by the intense colours of the Oman landscape, German painter Georg Popp created his own natural Omani pigments for his paintings, driving more than 4,000 kilometres with PDO geologist Salim al-Maskery in his search. Here Georg tells his story . . .

OMANI *Geo Paints*

Photographs by
Juma al-Maskery and Georg Popp

I visited Oman in February 1992 at the invitation of Juma al-Maskery. Juma had already introduced me to his country with stories and impressive photographs of its landscape and people. On my arrival, however, his brother, PDO geologist Salim al-Maskery, surprised me with the question, "What do you know about the geology of Oman?" Salim´s motto, "To understand Oman you have to understand its geology", became the leitmotif of my first visit.

Already on our first expedition to Wadi Sahtan, I had been struck by the uniqueness of the geological phenomena we passed. The colours of the stones were extraordinarily bright and, at the same time, extremely intense. From time to time I compared them with the colours of the paints I had brought with me from Germany and I came to the conclusion that my pigments seemed to belong to a different world. To do justice to the colours of Oman I would have to use natural Omani pigments – Omani Geo-Paints, as Salim named them.

This was easier said than done. First I would have to find the right geological materials to serve a basis. Then, I would have to grind these into pigments and carefully test their suitability for paint. In

Far left, some of the Omani pigments produced by grinding raw natural samples collected during a 4,000 kilometre trip. Left, a wadi scene, painted by the author using natural Omani colours. Above, part of the binding experiment usıng different agents. Note, the darkness of the samples to the right when mixed with oil.

order to produce an adequate number of different shades of colour it would be necessary, finally, to collect as many differently coloured samples as possible. For me, ignorant of the Omani countryside, this would be an impossible undertaking – but not for Salim, with whom I discussed my idea.

We three set off on an extraordinary sightseeing tour of Oman together, perhaps the first of its kind anywhere. I described to Salim the shade of colour I was looking for and he devised a route to it. We drove from black to yellow and from ochre to red. It was a masterly performance by Salim. He identified every geological site I needed and then managed to get us there. In two weeks we covered 4,000 kilometres off-road and collected over 23 pure-coloured mineral samples to take back with us to Muscat for further processing. These samples were to be the foundation for the set of Omani pigments we hoped to produce.

Now came the second step: the grinding. Not having an electric-powered rock-grinder, we turned to an old tried and tested Omani household implement, the mortar. First, we broke our mineral samples into nut-sized pieces with a hammer. We crushed these pieces in the mortar. The dust and sand produced this way were sieved. Any particles too large to pass through the sieve were placed back in the mortar and crushed again. We repeated this process on each mineral sample until it was completely pulverised. Within a week all 23 samples were ready to be turned into paint pigment.

However, our pigments differed fundamentally from industrially-produced pigments. Because of the crude manual production process their particle size varied for the most part from 4/10 to 5/1,000 millimetre. Commercially available oil and tempera paints, for example, contain pigments with a particle size of between 2/1,000 and 4/10,000 millimetre as a rule. Particle size has a decisive influence on a pigment´s colour properties, its dyeing capacity, the ability of a pigment to affect the colour of another pigment with which it had been mixed. Dyeing capacity varies inversely to particle size, the larger its particles the less dyeing capacity a pigment will have.

Furthermore, pigments produced of natural minerals vary in shade according to their origin and the climatic conditions to which they are exposed. It is impossible to grind large, qualitatively unique quantities of them. This prevents their industrial, but not their artistic use. The artist always work with small quantities of paint. He can as a result select the individual colouring agent he needs and prepare it in accordance with the particular idea he wishes to present.

So the pigments we produced may not have conformed to international industrial norms, but they reflected the true character of the Omani countryside. Something of the ruggedness of the terrain is communicated by the roughness of the pigment; the immense power of the sun is captured in the peculiarly bleached tones; the wealth of geological phenomena is evident in the variety of shades.

Since time immemorial, earth pigments have been among the most reliable and widely used of paint pigments. We thought we could demonstrate the reliability and practicability of the earth pigments of Oman as well by developing a uniquely Omani system of mineral-based paints ourselves.

In order to learn as much as possible about the various visual properties of the individual pigments, I made tests using binding agents of varying oil content. In each test the pigments were applied at graduated levels of thickness. The ➤

binding agents used were acrylic (no oil content), casein (low oil content) and linseed oil (high oil content).

When a pigment is mixed with a binding agent, it becomes wet and darker in colour. The colour-alternating components of watery binding agents like acrylic evaporate however quite rapidly as they dry. It is somewhat difficult to work with them. The painter must be able to anticipate the colour a paint will have when it has dried. With acrylic paints he can only be sure that they will not retain the same shade they had when he applied them. Binding agents with a higher oil content behave very differently. They are almost the same colour when they are dry as when they are wet. For this reason it is easier to work with oil paints than with acrylic paints.

Our tests produced the results we expected. A pigment is seldom suitable for all paint purposes. Its usefulness always depends upon the particular way in which it is employed. The particular binding agent used and the thickness with which a pigment is applied can produce noticeably different results.

The bright and sunny character of the Omani pigments was preserved when they were mixed with an acrylic binding agent. But it was weakened considerably when casein was used and destroyed completely by the use of linseed oil. When the oil paints were applied more thinly the colour change was much less noticeable. But the dusty impression made by the original pigment always took on an oily appearance.

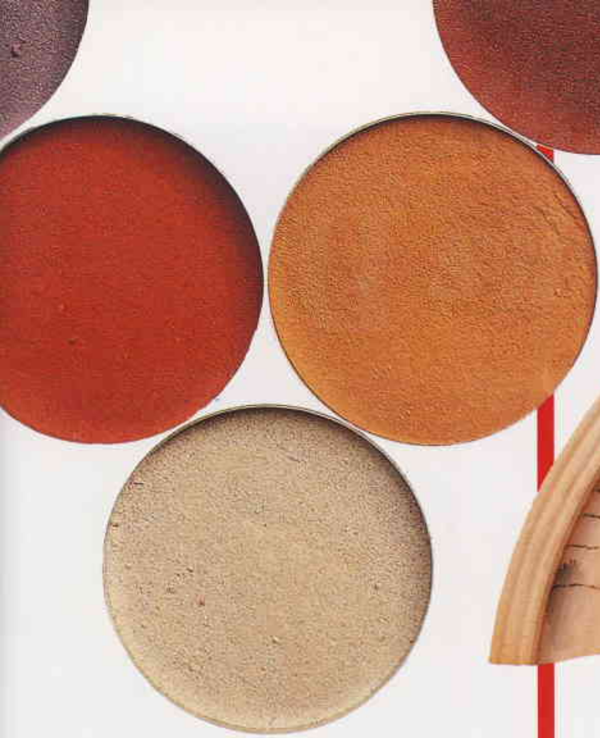
The tests demonstrated finally that only a watery binding agent would be appropriate for catching the light, the colours and the dryness of Oman. Oily binding agents produce rather the impression of a radical change in climate: they made the Omani landscape appear dull, dark and humid.

Having completed our investigations, I was ready now to get down to the very artistical challenge of actually painting pictures using our Omani Geo-Paints.

With the exception of the difficulty in working with watery acrylic binding agents, painting with most of the pigments tested proved to be problem-free. There were practical problems in applying one pink and two bright green pigments. In contrast to the other pigments, which consisted for the most part of small particles (1/100 millimetre to 5/1 000 millimetre), the average particle size of these three pigments obtained with a mortar was around 1/10 millimetres. In their structure they resembled somewhat the sand of the Wahiba. Wahiba sand itself could not be applied with a brush, however. It had to be scattered carefully by hand directly onto the picture surface.

The missing of "Blue" in our mineral colour system did cause another problem. The primary colours yellow, red and blue are the cornerstones of every system of colour. Yellow and red soils are easy to find, but blue minerals are very rare. The source of true ultramarine blue has always been the semi-precious stone lapis lazuli. One kilo of lapis lazuli often yields only 20 grammes of pigment, and that only after a costly process of refining and washing. Lapis blue is unexcelled however and it is easy to understand why even today the pigment is worth its weight in gold. But who would pay with gold, when buying blue colouring to dye a dish-dasha?

This Omani tradition points the way to another old and familiar natural organic blue: indigo. This shade of blue contrasts sharply with the bright and



Left, different grades of blue in this painting of Omani fish were created using a synthetic blue pigment bought from Muttrah suq.

shiny ultramarine blue of lapis lazuli. It possesses the magical depths and darkness of a night sky. I knew from my reading that indigo had formerly been produced in Ibri. Unfortunately, we were not able to go there, so we bought a package of "Blue" in the Muttrah suq. The pigment in it corresponded in colour to indigo and harmonized with the other unorganic pigments – just as an Omani in a dish-dasha harmonises with the Omani landscape. It was exactly the right blue to catch all shades of blue of Oman.

Max Dörner, in his standard work on painting techniques, "Malmaterial und seine Verwendung im Bilde", gives this account of indigo:

"Since antiquity, the indigo plant indigofera tinctoria has been extensively cultivated, chiefly in India. The leaves are harvested when the plant is in bloom and are leached in water. After a process of fermentation, the specially prepared leach solution is aerated by stirring. Through the resulting oxidation, deep blue, water-insoluble indigo is produced from water-soluble indoxyl. The indigo solution is then purified by heating and washing. Indigo was employed in European painting from the 14th to 19th centuries as pigment in oil, tempera and aquarelle ➤

Part A

Part B

UNDER FIRE

Earth pigments have served for a long time as material for ceramic glazing. For this reason it seemes to be a good idea to study the reactions of our pigment samples to heating in a kiln. The Munich ceramic atelier Heigert & Möbs kindly performed these tests for us.

The ceramic specialist Barbara Heigert described the tests and their results as follows:

" The Omani pigments were blended with water and evenly distributed one or two pieces of a ceramic plate. The first sample was then fired in an electric kiln at a temperature of 1040°C and in an atmosphere rich in oxygene (Test A). The second sample was fired in a gas kiln at 1230°C in an atmosphere poor in oxygene (Test B) . Test A (top): As expected the colours of the pigments were altered in the heating process, but they nonetheless retained their overall pastel character and rich hues. The samples whose particles were relatively large in size merely crumbled. The finely-grained pigments, on the other hand, solidified into a firm paste, indicating that most of the pigments contain properties suitable as slips for ceramics. Glass formation did not occur in any of the samples.
Test B (above): The higher temperature and the oxygene-poor atmosphere were apparently responsible for the general reduction in colour. It is noteworthy that in some samples (1,4,5,8,23) a glass type material was produced by melting. This suggests that these samples already contained soil alkalis as flux."

paints. It fades little when exposed to light. Synthetic indigo replaced natural indigo around 1900."

Owing to the complexity of the production process for natural indigo, this replacement probably occured in Oman as well. Dr Georg Kremer, an internationally renowned authority on pigments and paints, analysed my "Blue" from Muttrah Suq and concluded that it was a synthetic substitute probably of Indian origin.

This raises several interesting questions. Is natural indigo still produced anywhere in Oman? If not, is there anyone in Oman who still knows how to produce it? How has this knowledge been preserved for future generations of Omanis? What is the state of other traditional textile dyeing processes and the knowledge of the origin and application of such vegetable dyes, whose dark, yet colour-intensive shades constitute a system of colour just as unique, harmonic and complete as that of mineral-based pigments? Is the knowledge of these dyes and pigments still accessible to the current generation of Omani artists and craftsmen? To what extent has it already been collectively forgotten in Oman?

Because of its tumultuous history and isolation before 1970, Oman should be a unique treasure house of such knowledge. Dr. Kremer is regarded as a "dealer in lost colours". But are the colours of Oman truly lost, or has the knowledge of them been only partially obscured in the current rush for all things modern?

The standardization of hues by the chemical industry in the 20th century has led to the rapid disappearance of non-standardized natural paints from the market. The consequence has been an astonishingly rapid collective loss of knowledge in the industrial world concerning natural means of coloration.

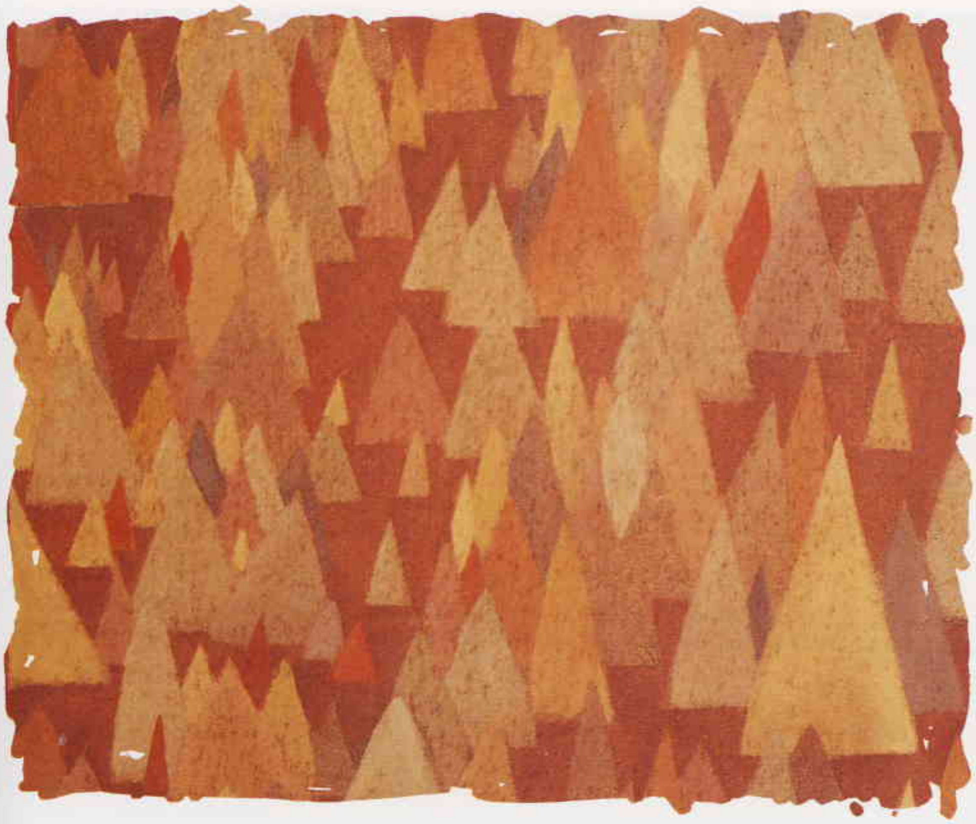
Who nowadays still associates minerals, herbs, tree bark or, indeed, plant aphids with the word "colour"? Colour has become something one merely buys in a tin or gets from a tube.

How many museum visitors are aware today that up until the end of the 19th century all pigments were usually ground by the painters themselves from materials found in their own environments? Or that the great artists, Rembrandt and Rubens for instance, developed their own systems of colour and their own techniques of painting, that paint formulas were often well-kept professional secrets and that the particular paints an artist employed were a crucial ingredient in the formation of his personal style or indeed that of an entire school?

In short: Non-standardized paint pigment is a fundamental element of artistic expression, one which has contributed decisively to the great variety of works of art throughout the world and to the development of individual artistic personalities.

Interest in old traditions of colour production has nothing to do with nostalgia for the past. It is rather an expression of a reasonable awareness of and respect for one´s own culture. The knowledge of natural pigments, moreover, is important for the preservation of the cultural heritage; successful restoration and conservation requires it as well.

It is true of course that industrially-produced pigments are usually cheaper, brighter in colour and often easier to use than natural pigments. However, many of the brightest and richest pigments are currently being withdrawn from the European market, due to the recent sobering discovery that



The road to Wadi Dayqa captured in true dusty colours along with a painting of a shell pattern by Georg Popp using Omani Geo-Paints.

their heavy metal components cause cancer. There is still much to observe and much to learn. Knowledge once attained should however be safeguarded and made generally available, not only to those who work with colours professionally, but also to the society as a whole, since the daily lives of all of us are constantly influenced, at least passively, by our perception of colours.

As a result of our studies and experiments, we would strongly recommend the establishment of an Omani colour centre. The purpose of this centre would be to safeguard the tradition of dye and pigment production in Oman, to encourage its development and to increase the awareness of its cultural importance.

We think the foundation of such a colour centre would contribute significantly to the preservation of Oman´s cultural identity. Only if contemporary arts and crafts do grow directly from the soil, there is a chance that in future the term "cultural inheritance" will not be applied exclusively to the cultural achievements of the past. Today´s culture is tomorrow´s cultural inheritance.

Below left, a small sample of Omani Geo-Paints under the Microscope. The large variety of sizes of particles is evident. Below right, the same shade of colours mixed from pigments produced by an electric rock-grinder seen at the same enlargment as the sample left. Particle size in general is smaller and so is variety in size itself.