

Painting by resonance

Chris Scarre

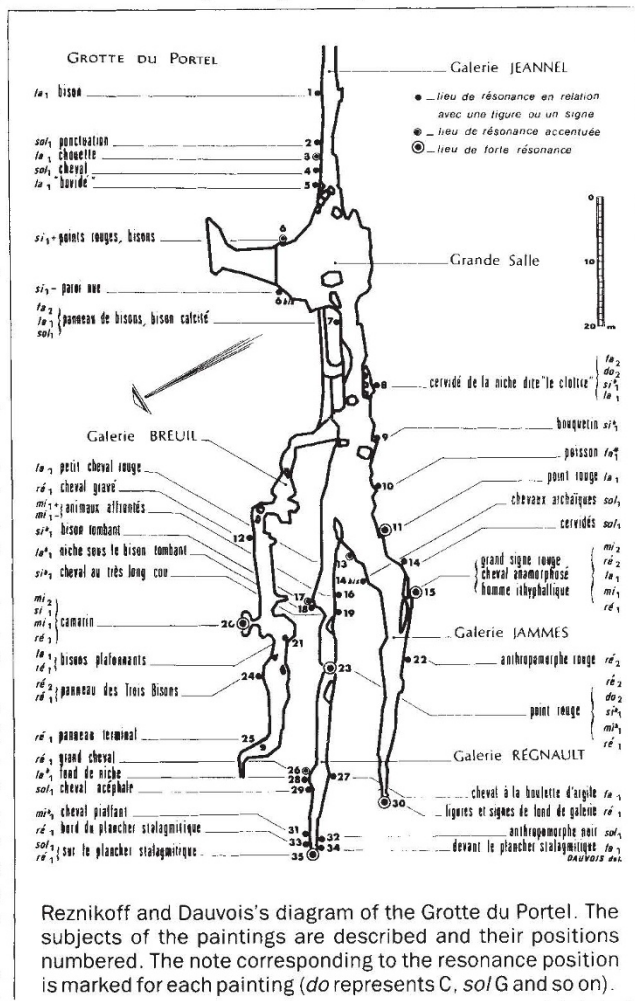
DID the painted caves of western Europe once resound to the music of Palaeolithic chants? Such is the thesis put forward by Iégor Reznikoff and Michel Dauvois in the latest issue of the *Bulletin de la Société Préhistorique Française* (85, 238–246; 1988). The authors have studied three caves in the Ariège department at the foot of the French Pyrenees. Their results suggest that the acoustics of the caves played a significant part in determining where the paintings were located, and this observation leads directly to the supposition that music or chants were important elements in cave ceremonies around 20,000 years ago.

Reznikoff and Dauvois rely on the fact that in certain places ("points of resonance") the caves resonate in response to particular notes. They proceeded slowly through the cave using their voices to produce a series of notes spanning almost three octaves, from C₁ to G₃. They extended the range of notes for a further two octaves by harmonics and whistling. Where there was a resonance response, they recorded the location and the particular note eliciting the response. They used these observations to draw up a resonance map of the cave (see figure).

The resonance of the caves is not in itself surprising, but the significance of the study becomes apparent when the authors compare their points of resonance with the location of cave paintings. They draw three main conclusions. First, most of the cave paintings are at or within 1 metre of points of resonance. The Grande Salle at Portel, for example, which gave no resonance response, also has relatively few paintings. Second, most of the points of resonance correspond to locations with cave paintings. Indeed, the best points of resonance are always marked in this way. Finally, the authors claim that the location of some of the paintings can be explained only by the resonance of that particular location. A good example is number 23 at Portel (see figure), where a particularly effective

point of resonance is marked by red painted dots, as there is not enough room for a full painted figure.

Reznikoff and Dauvois remark from their own experience on the impressive effect of cave resonance, which would have been all the more striking in the flickering half-light of the simple lamps or tapers used by the original artists. Drums, flutes and whistles may have been used in cave rituals — bone flutes have been found at several Palaeolithic sites in Europe of roughly the same age as the paintings. The potential of cave resonance



would, however, be elicited only by the much greater range of the human voice. The image of the cave artists chanting incantations in front of their paintings may not be too fanciful. Reconstructing prehistoric sounds is inevitably a risky and ambitious venture, but this study is of particular value in drawing new attention to the likely importance of music and singing in the rituals of our early ancestors. □

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Time out of mind

LIKE many busy people, Daedalus often wishes there were more hours in the day. Indeed, he has given serious thought to slowing down the rotation of the Earth, but still cannot think of a suitable dumping-ground for the surplus angular momentum. Instead, he is exploring the possibility of speeding up the human internal clock. In most people its free-running period is about 25 hours, entrained with more or less reluctance to the 24-hour day by the pitiless light of morning. But those infuriating eager-beavers who snap into action at the crack of dawn presumably have a cycle of less than 24 hours, and so adjust to the natural day with some phase-lead.

Many other creatures also have an inbuilt circadian rhythm. It seems to be genetically determined; hamsters and fruitflies sometimes occur in mutated forms with a different circadian period, or even with none at all. These mutations seem to work by altering the output of some time-regulator protein. If the same mechanism works in man, then the human internal clock could be neatly adjusted by altering the output of this protein. So DREADCO's pharmacologists are trying to develop a drug which either blocks the receptors for the timing protein, or inhibits or facilitates its production. In the current state of knowledge, this has to be a hit-and-miss business; but the hormone melatonin and the benzodiazepine tranquilizers, both of which affect the biological clock, seem a good place to start. Serum analysis of volunteer sluggards and human dynamos may also be revealing.

DREADCO's Regulator[®] tablets will bring wonderful harmony to all our lives. Those who (like Daedalus) find that morning comes too soon, will shorten their cycle by cautious doses of the appropriate Regulator until they are in perfect tune with the clock. Their short-cycle brethren will lengthen their subjective day to make the most of the evening. But Daedalus is most intrigued by the possibility of a special Regulator which, like the *per⁰* mutation in fruitflies, does not merely alter the circadian rhythm but actually abolishes it. Acyclic individuals will live a very unusual life. They will show no particular tendency to go to sleep; once asleep, however, they will show no particular tendency to wake up. Having no time-sense, they will never be bored; and they will only eat when actually hungry. Acyclic workers will take over all the continuous industrial processes which are currently manned imperfectly, and often dangerously, in shifts. They will severely test theories about the importance of sleep and dreams to human mental functioning. And if our lifespan is indeed counted off in periods of the circadian rhythm, they should live forever.

David Jones