

LETTERS TO THE EDITORS

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Origins of Human Graphic Art

THE following incident deserves scientific record, both for its intrinsic interest and for its bearing on the possible origins of human graphic art.

Meng, a young mountain gorilla (*Gorilla g. beringeri*), previously in the Zoological Society's collection at Regent's Park, was kept in a cage with white tiled walls, illuminated by a single powerful electric light. When he stood in a certain position close to the wall, the light cast a well-defined shadow of the animal on to the white surface. I was watching him one day in February 1939, when he was approximately one and a half years old. Seeing his shadow before him at one moment, he stopped, looked at it, and proceeded to trace its outline with his forefinger.

Luckily, there was an independent scientific witness of this act, as I was accompanied by Mr. E. B. Ford of Oxford. He also had noticed the gorilla's action, and agreed that it was clearly deliberate. The animal proceeded to repeat the same action twice more, but then went on with his play.

I later arranged for a small projection lantern to be set up in the cage so that shadows of different shape could be thrown on the wall. However, the gorilla refused to take any interest, and was never seen to repeat the original performance before his death at the age of about three years. I should add that Meng was exceptionally intelligent and docile.

I can find no record in the literature of any anthropoid performing a similar action. It would be of considerable interest if observation and experiment designed to elicit similar behaviour were carried out on other young anthropoids.

Various suggestions have been made as to the origins of human graphic art: for example, scribbling, the incision of geometrical patterns or their tracing in sand or clay, tracing the outline of a hand or other object held against a rock face, as well as deliberate attempts at representation. To these I think we should add the possibility of tracing the shadows cast by a low sun against a more or less vertical cliff or cave-wall.

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Effect of Ascorbic Acid on the Survival of Traumatized Animals

CLINICAL observers seem to be generally agreed that there is little relation between the degree of traumatic shock and the severity of the injury by which it is produced. However, the following observations, made during the course of a general study of wound ballistics, suggest that there is a quantitative relation between shock and trauma, even though there may remain some doubt how far the traumatic shock seen in experimental animals is equivalent to the clinical condition of 'shock' observed in man.

The primary purpose of these observations was to relate the degree of trauma, expressed in terms of

the energy by which it is caused (all other conditions being kept constant) and the severity of 'shock' as estimated by the mortality-rate in groups of anaesthetized animals traumatized to different degrees. Thus, in a first series of experiments with anaesthetized guinea pigs, it was possible to calculate the amount of energy transmitted to the tissues by the missile by which they were injured. It was found that the amount of energy is related both to the degree of tissue damage and to the mortality-rate.

In a second series of experiments, anaesthetized guinea pigs were traumatized by means of a weight falling from different heights. It was again found that there is a definite relation between the mortality-rate and the amount of transmitted energy. Thus, death practically never occurs when the energy of the blow is less than 2.75 kgm. m. It occurs more frequently at energy levels between 2.8 and 3.4 kgm. m., and appears to be constant at a level of 3.7 kgm. m. Post-mortem examination of the animals used in these experiments showed the typical haemorrhagic lesions which are stated to be characteristic of shock (Moon, 1938)¹.

If it be assumed that the condition of the animals during the post-traumatic interval is equivalent to that which is clinically recognized as 'shock', these experiments suggest that there is a quantitative relationship between the intensity of shock and the chances of survival on one hand, and the degree of trauma administered on the other. A similar conclusion is suggested by Noble and Collip (1942)² in a paper which has just appeared.

A further series of experiments has been carried out in order to test the effect of ascorbic acid on the survival of guinea pigs injured by a falling weight. It was found that animals subjected to the minimum degree of traumatization which otherwise would have caused 100 per cent mortality always survived after the subcutaneous injection of ascorbic acid, in doses above 100 mgm./kgm. body weight. The beneficial effect of the ascorbic acid becomes increasingly less if treatment is delayed after traumatization. Thus, if the injection of ascorbic acid is made after the lapse of an hour, survival occurs in only some 50 per cent of the experimental animals. Following a suggestion by Dr. A. N. Drury, the influence of vitamin B₁, in doses of 5-15 mgm./kgm. body weight, was also tested. This substance was found to be less effective than ascorbic acid, only four of a group of ten traumatized animals given vitamin B₁ surviving.

The way in which ascorbic acid exercises its effect in these circumstances is unknown. Guinea pigs, like man, do not synthesize their own ascorbic acid, but obtain the vitamin from their food. All the guinea pigs used in these experiments were maintained on the same diet, but, since no vitamin C estimations were performed, it is not impossible that some of them were deficient in this factor. Whether or not this was the case, the experiments suggest that the administration of ascorbic acid in doses higher than the normal vitamin requirement has a very marked effect upon survival. The possibility that the effect is due to some pharmacological property not encompassed by the term 'vitamin' was tested in a further set of experiments on rats, which were also traumatized by means of the falling weight technique. As in the case of guinea pigs, it was found that rats which were traumatized at a level of energy-input at which control experiment showed that death would normally ensue, survived if given ascorbic acid, shortly after the trauma,