this period and its nonconformity to currently proposed views of Mesoamerican culture development (*3, 7*) will be clear. The difficulty of accepting certain sculptured pieces from the Olmec area which bear initial series inscriptions—such as the Tuxtla statuette and stela C from Tres Zapotes—on the grounds of the improbably early dates indicated (*8*) would appear to be greatly diminished. The final report on the 1955 excavations at La Venta is nearing completion and will be published by the Bureau of American Ethnology.

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Probable Cause of Necrotic Spider Bite in the Midwest

Current medical references used by practising physicians list the black widow, *Latrodectus mactans,* and other species of *Latrodectus* as the only spiders occurring in the United States that may inflict bites serious enough to require medical treatment. Physicians practising in rural areas in the Midwest have realized for some time that other species occasionally bite and cause conditions, which, though less generally severe than those occasioned by the bite of *L. mactans,* are serious enough to require attention. In some cases the animal inflicting the bite has not been observed by the patient, and the attending physician has attributed the condition to "insect bite."

With the exception of certain species of Reduviidae, there are no midwestern Hexapoda known to inflict severe injury by bite to human beings. According to Herms (*1*) reduviid bites are characterized by intense local pain, swelling, intense itching, and, in a few cases, profuse urticaria over the body and a local cellulitis followed by necrosis in the immediate vicinity of the bite. In a few days the symptoms resulting from reduviid bite are usually gone.

Several clinical cases of spider bite in Missouri by a "brown spider" are available. Usually, the spider became entangled in the patient's clothing and bit when it was crushed or removed. First symptoms varied, presumably with the relative amount of venom injected, but a thick wheal usually forms with necrosis of tissues at the immediate site of the punctures made by the chelicerae. The necrotic area soon turns violaceous, then black and dry. This area sloughs in a few days or a week, leaving a deep, sharply-defined granular area surrounded by the raised edges of healthy tissue. The sloughed area, frequently quite large, may persist for several weeks, and healing takes place very slowly. In a few patients, systemic disturbance of a general nature has been indicated by a rash resembling that of scarlet fever.

In these cases, spiders inflicting such necrotizing venom have not been available for identification. In a single case a specimen of *Loxosceles reclusus* Gertsch and Mulaik has been circumstantially incriminated.

A striking similarity between these necrotic, spider-inflicted wounds in Missouri and the "gangrenous spot" or cutaneous arachnoidism of Chile, Uruguay, and other South American countries is evident. Macchiavello (*2*) first indicated *Loxosceles laeta* (Nicolet) as the causative agent of such gangrenous spot on human beings in Chile as early as 1937. Subsequent experimentation with the glandular poison of *L. laeta* by Macchiavello (*3*) and by MacKinnon and Witkind (*4*) has established firmly the role of *L. laeta* in cutaneous arachnoidism in South America. Symptoms in patients bitten by *L. laeta* are similar to those in patients observed in Missouri.

Since *Loxosceles reclusus* was circumstantially incriminated in human necrosis before the South American literature was reviewed, and since it belongs in the same genus, it is not unduly presumptive tentatively to assign to *L. reclusus* the same relationship with cutaneous arachnoidism in Missouri that *L. laeta* bears to that condition in South America. Experiments are currently underway involving *Loxosceles reclusus* and laboratory animals. Preliminary results indicate that the venom of *L. reclusus* is a powerful necrotizing agent capable of causing cutaneous necrosis in mammals.

Gertsch (*5*), in discussing spider venoms, states that the venom of a few spiders is fortified with toxins that cause severe local or general reactions. He reports that some venoms contain hematoxins that destroy cells in the vicinity of the wound and result in extensive sloughing and exposure of underlying tissues. *Loxosceles laeta* is the proved agent causing such conditions in South America. *Loxosceles reclusus* is probably responsible for the same conditions in the southern and southwestern United States as well as in the Midwest (*6*).

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* Deceased December 1956.

27 March 1957

Influence of Prenatal Maternal Anxiety on Emotionality in Young Rats

W. R. Thompson [*Science* **125**, 698 (1957)] has reported results which are compatible with the hypothesis that "prenatal maternal anxiety does actually increase the emotionality of offspring." Five female rats were trained "first to expect strong shock at the sound of a buzzer, and then to avoid the shock by opening a door between the compartments and running through to the safe side." These rats, as well as a group of five control rats, were then mated.

During gestation, the experimental mothers were "exposed to the buzzer three times every day in the shock side of the shuttlebox, but with the shock turned off and the door to the safe side locked." The offspring of the experimental and control mothers were tested for differences in "emotionality," and the observed differences were traced to the stress situations which were imposed on the experimental mothers during gestation.

It is possible, however, that differences in prenatal environment may have resulted from maternal hormonal differences caused by systemic changes which were produced in response to the stress

of the training period. This variable could be controlled by subjecting the control mothers to the same training and premating stress as the experimental mothers.

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I am grateful to A. R. Kaplan for pointing out a possible interpretation of my experimental results on prenatal influences [*Science* **125**, 698 (1957)] that I had been quite aware of but had neglected to indicate in the published article. I am now starting a project to examine this question thoroughly.

How such effects, if they really occur, have their action cannot be answered at present. But I would suggest that a mother stressed before pregnancy would tend to have a much lower threshold of reactivity to any of the mild stresses that may occur during the course of normal laboratory life. Thus, radically altering the mother before pregnancy may be quite equivalent to radically altering the environment during pregnancy.

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1 May 1957

Electroencephalographic "Blocking" and "Adaptation"

Under the title "EEG, consciousness, and sleep," Simon and Emmons (*1*) have presented evidence that conditions of wakefulness favorable to recognition and recall of stimuli are accompanied or preceded within 30 seconds by recordable alpha rhythm. Yet the authors recognize that processes of attention or concentration following stimulation tend to be simultaneous with reduction or "blocking" of the alpha rhythm.

Although the electroencephalogram is a record, from outside the head, of electric activity in the underlying cortex, the magnitude of this activity depends to a very large extent on the effectiveness of subcortical pacemakers in driving and synchronizing the cortical cellular activity (*2*). It follows that the blocking of alpha by stimulation can be easily explained if it is assumed that, during reaction, the cortical cells engage in independent, nonsynchronous activity (*3*). However, recent evidence shows that, at least in the case of peripheral stimuli, blocking or "activation" of the cortex may be the result of asynchronous subcortical impulses to the cortex from the brain stem reticular formation (*4*). Whether this latter explanation applies equally to blocking by perceptual and ideational stimuli, which depend for effectiveness on cortical or cortico-thalamic integrative and interpretative processes, may still be a question.

Particularly significant is the fact that blocking occurs in response to any *new* stimulus that calls for interpretation or readjustment but disappears as the stimulus is evaluated and adjusted to. An example of decreased blocking by successive loud gong stimuli at 10-second intervals is presented in Fig. 1. Measurements of the "percent time alpha" (*5*) of 20 left occipital electroencephalographic records were obtained by conventional methods. The percentage of time occupied by sequences of three or more 8- to 12-per-second waves of more than 15 μv amplitude was determined for the 3 seconds before and the 3 seconds after each gong stimulus. The mean effects of nine successive repetitions for 20 subjects show a progressive reduction of blocking. The decrease of blocking from gong 1 to gong 6 is 16.02 percent, and from gong 1 to gong 9 is 28.12 percent. The probability of this decrease occurring by chance is less than 5 in 100 at gong 6 and less than 1 in 100 at gong 9.

Phase relationships of waves in different head areas had previously shown reliable adaptation of response to successive gong stimuli, and the palmar galvanic responses were likewise reliably reduced with repetition (*6*). We have also found that, with eyes closed, repeated writing of a word on an imaginary blackboard produces marked initial blocking, especially in the left hemisphere, and a decrease or elimination of blocking with practice. In fact, any novel stimulus or activity will tend, at first, to be accompanied by blocking of the alpha rhythm, and, with familiarity, habituation, solution of the problem, or rendering of the activity automatic, alpha will be restored.

Similar observations of blocking of the alpha rhythm are to be found throughout the literature on the electroencephalogram. Their import, however, is not always made explicit. That blocking occurs during periods of attention, adjustment, and problem solving, when cortical integrative processes are going on, and that alpha returns with "automation" as other mechanisms, presumably subcortical, become competent to carry on and free the cortex for new problems deserve consideration. As is possibly evident in Simon and Emmon's observation of the waking resting state, alpha may then prevail, and the cortex will ride the wave of mental operations as monitor—to intervene only when things in some department fail to run smoothly.

The possibility of a shift from blocking to alpha activity with repetition, from active integration to automation, and from, presumably, cortical to subcortical control with habituation accounts likewise for many puzzling observations. It explains, for example, the fact noted by Hebb (*7*) and others that complex test behaviors involving *learned* skills which are probably relegated to subcortical control may be relatively little disturbed by extensive cortical damage. It explains how complex psychomotor behaviors, which were once cortically determined, may sometimes become inaccessible and uncontrolled when routinized under automatic subcortical control. It explains Simon and Emmons' observation of a relatively high incidence of waking alpha during learning of repeated stimuli, notwithstanding the blocking effects usually associated with processes of attention or "concentration."

If the afore-noted electroencephalographic indications of the shifting levels

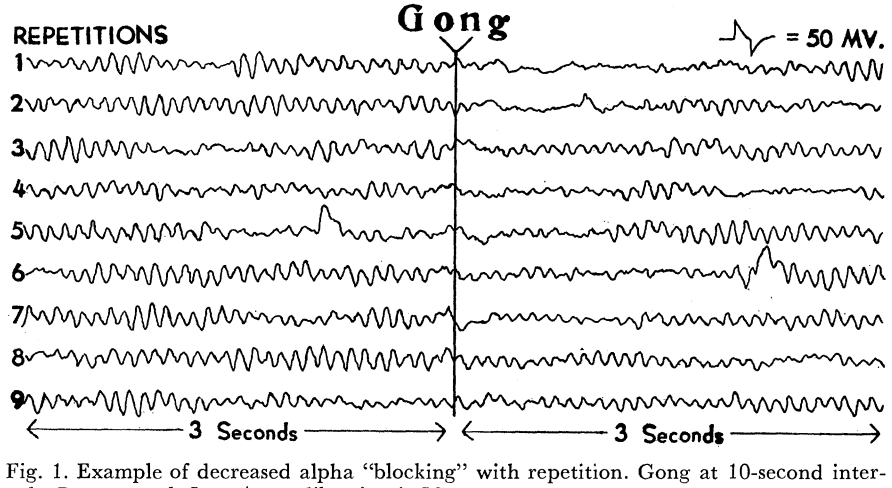

Fig. 1. Example of decreased alpha "blocking" with repetition. Gong at 10-second intervals. Paper speed, 5 cm/sec calibration is 50 μv.