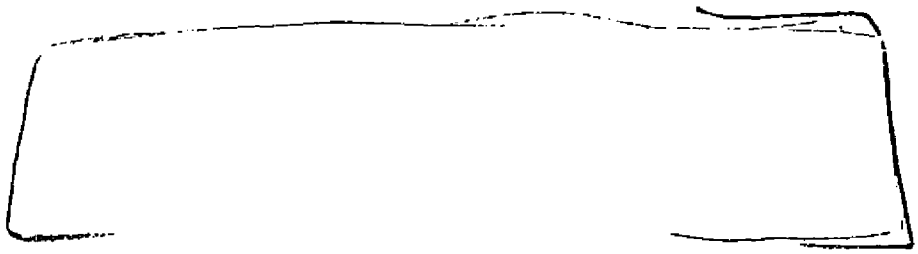
THE BLACK VAULT



Period Covered: June 15, 1966 to October 15, 1966

I. Experimental

Following is a brief synopsis of activities under this contract performed during the first four months. Details will appear in the six-month report.

1. Animal experiments involved electrical stimulation of the plantar nerve in cats, while recording skin potential responses and conductance responses from the foot pad. Response amplitude was found to be strongly potentiated by increasing periods of rest between test series. This effect appears to be due to the state of resting hydration. It affects both potential response and conductance response and conductance response and may account for a 100 per cent difference in response amplitude.

2. Microelectrode studies were extended to observation of potential response from sweat gland pores and from epidermal sites along with simultaneous recordings from large sites with conventional electrodes. The epidermal sites gave primarily positive responses at the same time as the sweat pore and the gross site was producing negative responses. This finding was consistant with the hypothesis that the positive responses are of epidermal origin and reflect a different type of biological adaptation than does the sweat gland activation.

3. Further experiments were carried out on the nail bed to determine whether these alleged epidermal responses were in fact only artifacts of nearby skin activity due to volume conduction. Strong positive potential responses were found to be easily eliminated by puncture of the epidermis with the microelectrode used for the recording. Negative responses, if present, could not be so eliminated. The possibility that the weak negative responses are of vascular origin is being examined. This effect would confound the interpretation of negative waves from the sweat gland at normal skin sites.

4. Experiments to investigate the temperature effect on amplitude of the positive skin potential response have been initiated. There is a potentiation of the positive wave with increasing room temperature (these induced temperature changes are not local as in previous experiments) indicating that the epidermal component (if this is the origin of the positive wave) possibly serves a thermoregulatory function and is indicative of a covert preparation for motor activity. The negative wave, presumed to be of sweat gland origin, is not potentiated by increasing room temperature.

This is not surprising if these sweat glands are non-thermoregulatory as claimed by Kuno and others.

5. A model, relating potential responses to conductance responses, has been developed, and is serving as a guide to the direction of experimentation and interpretation of results. This model, attributing negative waves and the long lasting component of the conductance response to sweat gland activity and positive waves and the fast-recovering component of the conductance response to epidermal activity points to methods for their separation. One method involves analysis of the recovery slope of the skin resistance response. The other entails the use of high frequency impedance measurements in conjunction with conventional D.C. measurements of skin resistance. These measurements are now under test.

II. Research facilities and personnel

[redacted] procured under this contract has been delivered and is in operation. The laboratory for the animal work and microelectrode work has been renovated and is also in operation. All personnel engaged in the research activities under this contract have been recruited and trained where necessary.