found to produce mild symptoms in experimental studies with *Macacus rhesus* monkeys.

Variation in Immunity. Burnet and Macnamara[5] have recorded the existence of immunologic differences between a strain of poliomyelitis virus isolated in Australia and the "M.V." strain.

In the present study it is seen that monkeys recovered from infection with Los Angeles strain of virus demonstrate immunity and neutralizing antibody to both the Los Angeles and the "M.V." virus but that these are higher when tested with Los Angeles virus than when tested with "M.V." virus. Likewise convalescent patients from the Los Angeles epidemic demonstrate a higher neutralizing antibody titre to Los Angeles virus than to "M.V." virus. There is, therefore, demonstrated a definite immunologic relationship between the Los Angeles and the "M.V." strains with, however, minor variations in the degree of immunity produced against local and "M.V." virus.

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Functional Boundaries in the Sensori-Motor Cortex of the Monkey.*

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The method of local strychninization of the cerebral cortex of the monkey has already established the existence of functional boundaries between the major subdivisions of the sensori-motor cortex, so far as sensation is concerned.

Further study of the problem by the same method, supplemented by recording the action potentials of the cortex, has confirmed the existence of functional boundaries on the "sensory" side and established the existence of such boundaries on the "motor" side.

Strychnine applied locally to any region of the cortex induces in that region typical changes of the "spontaneous" action potentials, notably the appearance of "strychnine-spikes". Though the structural dissimilarity of the various cortical regions precludes the

[5] Burnet, F. M., and Macnamara, J., *Brit. J. Exp. Path.*, 1931, **12**, 57.

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attribution of these spikes to any one specific structural element in the cortex, the distribution of the spikes over the cortex differs with difference in architectonic structure of the regions strychninized.

Local strychninization of any one or two square millimeters of area *4* of any subdivision of the sensori-motor cortex "fires" the whole of area *4* of this subdivision and also its postcentral portion. Outside this subdivision no spikes appear.

This is evidenced by the accompanying figure obtained before and after strychninization of one square millimeter of arm area *4*.

Since the action potentials were taken from arm area *4* at a place as far removed as possible (12 mm.) from the locus of strychninization, the figure illustrates the occurrence of spikes throughout this area. Although the electrodes on the face area were only 2 mm.

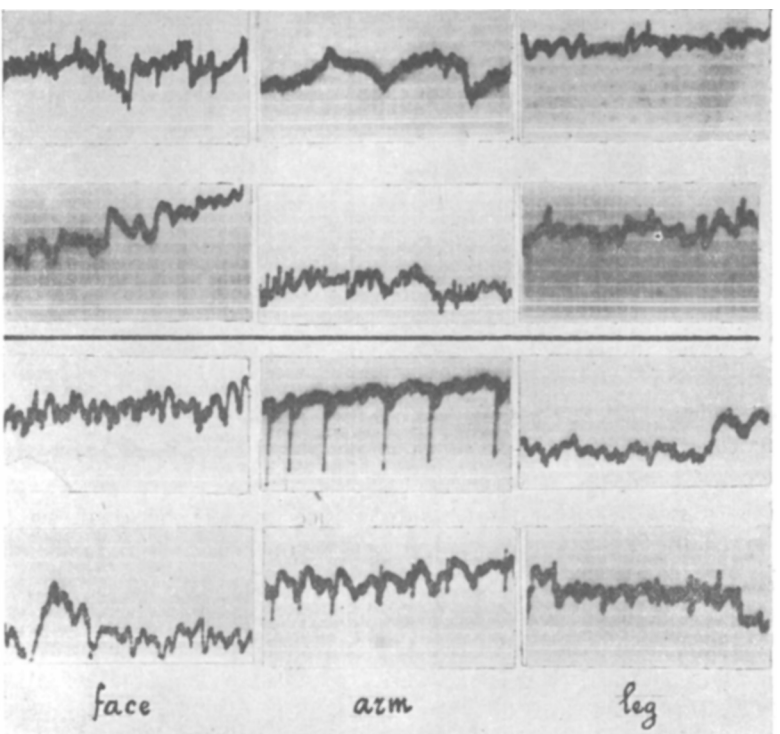

FIG. 1.

Cathode ray oscillograms of action potentials from the precentral and postcentral regions of the face, arm and leg subdivisions of the sensori-motor cortex before (rows 1 and 2 respectively) and after (rows 3 and 4) local strychninization of one square millimeter of the arm area *4*. Note strychnine-spikes in arm area *4* and in postcentral arm area, absence of spikes in face and leg areas.

from those on the arm area, no spikes appear in the record from the face area; and although the electrodes on the leg area were only 2 mm. from the locus of strychninization in the arm area, no spikes appear in the record from the leg area. Distance as such, in area *4*, is insignificant. Functional boundaries determine the findings.

Because strychnine overrides architectonic boundaries while it respects functional boundaries, it has proved a powerful tool in revealing, without disrupting, the functional organization in the intact cortex, by disclosure of differences in functional relations among many of its areas.

This is further instanced by the following observations.

Local strychninization of a small portion of postcentral arm area *1* or *2* "fires" arm areas *1*, *2* and *5*, but whereas the strychninization in arm area *2* "fires" arm area *4*, that in arm area *1* decreases the electrical activity of *4*. In neither case is the leg or face subdivision "fired".

A comparable difference exists between the anterior portions of area *6* and its posterior portion, *i. e.*, Hines' "strip" adjacent to area *4*. Local strychninization in the anterior portion of area *6*, whether situated in front of leg area *4* or of arm area *4*, "fires" all the pre- and postcentral portions of the arm and leg subdivisions, whereas strychninization in the "strip" reduces the electrical activity of area *4*.

These findings on area *6* are in harmony with those obtained by extirpation and stimulation of this area (Richter and Hines[1], Bucy and Fulton,[2] Hines[3]).

Studies on action potentials of the cortex and cord and on facilitation of the motor response, both following electrical stimulation of the cortex, have confirmed the existence of the functional boundaries between the major subdivisions of the sensori-motor cortex and given some indication of their significance in the functional organization of the cortex, so far as motion is concerned.

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1 Richter, C. P., and Hines. M. *Am. J. Physiol.*, 1932, **101**, 467.

2 Bucy, P. C., and Fulton, J. F., *Brain*, 1933, **56**, 318.

3 Hines, M., *Am. J. Physiol.*, 1936, **116**, 76.