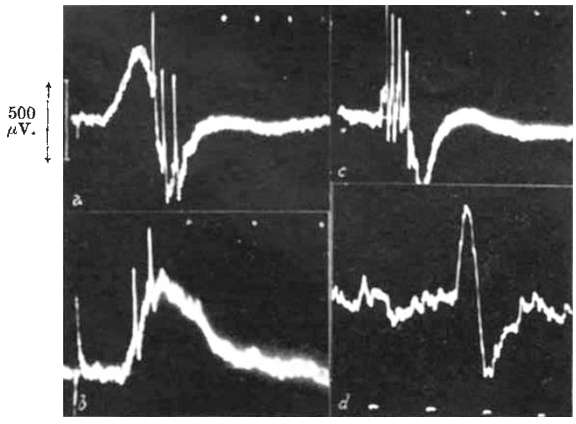

Fig. 1. Patterns of single soma activity in feline somatosensory areas I and II. (*a*) Unit firing after peak of primary response. Unit recorded just anterior to cruciate sulcus. Chloralose-tubocurarine anæsthesia. Stimulus to contralateral ulnar nerve. Time interval, 10 msec. (*b*) Unit just behind cruciate sulcus and 1·2 mm. deep. Chloralose *B*-erythroidine. Time interval, 10 msec. (*c*) Unit anterior to ansate sulcus. Chloralose-tubocurarine. Time interval, 10 msec. Shock indicated by dot below trace. (*d*) Fast sweep from unit in area II at 1·5 mm. depth. Contralateral median nerve stimulated. Dial. Time interval, 1 msec. In all records microelectrode negativity indicated by upward deflexion of trace. Voltage calibration refers to upper records. Note primary response reversed in sign. (V. E. AMASSIAN)

responsible for the latter. The number of spikes per response varied from one to seven. The highest rate of discharge observed was 1,000/sec.

It is difficult to reconcile these findings with those reported recently by Cragg[3]. In view of the consistency of our findings in all three major sensory receiving areas of the cat and the monkey under a wide variety of experimental conditions, it seems worth while to comment upon these discrepancies. We have never seen wave-forms such as those presented in Fig. 1 (*b*1) of Cragg's communication, except when recording with a defectively insulated metal electrode, or when inadequate precautions have been taken to minimize movement of the brain with respect to electrode or electrode polarization. The reported maximal spike amplitude of 35 mV. is certainly very surprising. We never obtained amplitudes greater than 3 mV. without damaging the unit, with subsequent injury discharge and/or abrupt depolarization, although electrodes as small as 4 μ were often used. Somewhat similar techniques in the hands of Lloyd[4], Renshaw[5] and others working with the spinal cord have yielded potentials up to 6 mV., but not much more. An amplitude of 35 mV. would suggest that the microelectrode tip lay within the cell, were it not for the fact that the unit in Fig. 1 (*b*1) is negative in sign. We feel that a minimum criterion for identification and analysis of cortical single-unit records is reproducibility of unit firing over at least two stimulus cycles, using sufficiently fast sweep speeds to obtain clear resolution of individual spikes in the high-frequency burst. Such a standard is not at all difficult to attain, and cortical unit activity must be followed for several minutes before conclusions can be safely drawn.

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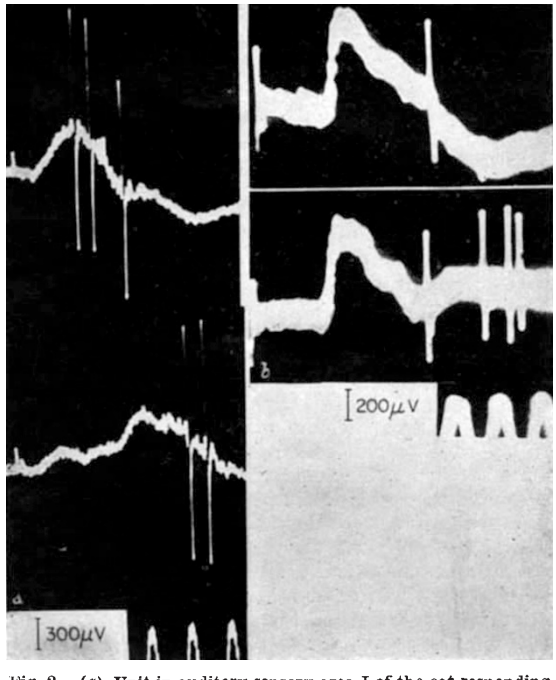

Fig. 2. (*a*) Unit in auditory sensory area I of the cat responding to click stimulus in contralateral ear (top record) and in ipsilateral ear (bottom record). Note differences in latency and pattern of response. (*b*) Unit in visual sensory area I of the cat responding to gross photic stimulation. Note variation in pattern. Time calibration, 60 c./s. Upward deflexion, microelectrode negative. (L. B. THOMAS)

[1] Renshaw, B., Forbes, A., and Morison, B. R., *J. Neurophysiol.*, **3**, 74 (1940).
[2] Nastuk, W. L., and Hodgkin, A. L., *J. Cell. and Comp. Physiol.*, **35**, 39 (1950).
[3] Cragg, B. G., *Nature*, **169**, 240 (1952).
[4] Lloyd, D. P. C., *J. Neurophysiol.*, **5**, 435 (1942).
[5] Renshaw, B., *J. Neurophysiol.*, **9**, 191 (1946).

Amassian and Thomas are somewhat bold in implying that the complexities of the cortex can be reduced to no more than these simple and consistent patterns of response. Apart from their use of paralytic drugs, the main difference between our techniques lies in the size of electrodes used; mine were "of less than 5 μ diameter" and the action potentials of many millivolts amplitude were recorded only from electrodes of about 1 μ tip diameter. It is probable that electrodes of 4–12 μ tip diameter record distinct action potentials only from particularly large cells, which tend to be well separated, and this may be responsible for the simple and consistent responses obtained. Regarding the reproducibility of small electrode recordings, I have found that in a long series the number of action potentials evoked by a stimulus may vary widely; but there is a fairly constant latency at any one locus for the first appearance of action potentials belonging to a given group.

I should like to take this opportunity of pointing out an error in the reproduction of my photographs in *Nature* of February 9, p. 240; all the calibration arrows should have been 6·8 mm. long on the scale used.

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