l'intestin postérieur contenant des Bactéries, un retour en arrière du bol alimentaire à partir de cette poche jusque dans l'intestin moyen; la cellulose et les sucres solubles du bois consommé sont utilisés par les Bactéries, tandis que l'insecte, grâce à ses propres enzymes, digère une partie des Bactéries lors du retour en arrière des aliments.

Il n'apparaît pas qu'un tel processus existe dans l'intestin des *Microcerotermes*. Par ailleurs, la première poche de l'intestin postérieur, où le bol alimentaire demeure plusieurs heures, n'est certainement pas un conduit passif reliant l'intestin moyen et la deuxième poche, tel que l'examen histologique peut le laisser croire[1]; ceci est confirmé par l'étude du pH du contenu de cette poche qui décroît notablement depuis le partie antérieure (liée à l'intestin moyen par l'intermédiaire d'un «segment mixte») jusqu'à la valvule entérique[4]. Il n'est pas étonnant de constater que les aliments stagnent jusqu'à 12 h dans la deuxième poche qui est une véritable chambre à fermentation où la cellulolyse aboutit, entre autres, semble-t-il, à la production d'acides gras volatils[5].

Summary. Intestinal transit in *Microcerotermes edentatus* (Amitermitinae) lasts about 24 h. It is uni-directional and rapid up to the first pouch of the hindgut. The second pouch, which takes up 8–12 h, is undoubtedly equivalent to the 'rectal pouch' of the lower termites.

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Origin of the Direct Cortical Response as Studied in vitro in Thin Cortical Sections

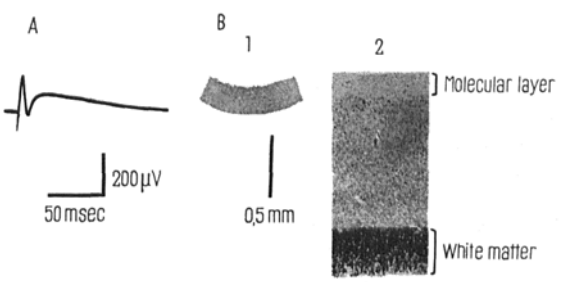
Direct stimulation of the intact cortex elicits from the nearby cortical points 2 consecutive negative waves[1] which together are called the direct cortical response. Hitherto, the locus of origin of the potential has been studied by indirect techniques such as laminar recording and laminar stimulation and it has been concluded that the initial sharp wave represents the depolarization of the apical dendrites and the second slow one reflects the summated action potentials of the interneurons in the deep layers[1,2]. In the present experiments we tried to excise a single layer from the cortex and record the potential from it in the artificial medium. In this way, we thought, we should be able to obtain direct informations identifying the cortical layer in which each component of the direct cortical response originated. It was found that, even in the slices consisting of the molecular layer alone, direct stimulation generated not only the first sharp component but also the second slow one. These results disprove the interpretation that the second wave is produced by the intracortical interneurons.

Slices approximately 0.2 mm thick were prepared from the superficial layer of the guinea-pig neocortex and incubated in a glucose-saline medium saturated with 95% oxygen and 5% carbon dioxide at 37 °C. The stimulating electrodes were a pair of ball-tipped silver wires rested on the slice. The recording electrode was also a ball-tipped silver wire placed on the slice at a point a few mm away from the site of stimulation. After experiments, slices were examined histologically in serial sections stained by Klüver-Barrera method.

The potential evoked by direct stimulation of a cortical slice is shown in Figure A and a histological section of the thickest part of the same slice is demonstrated in Figure B-1. The histological section indicates that the slice was mostly composed of the molecular layer and a negligible, if any, amount of the nerve cells in the deeper layers were included in the slice. As shown in Figure A, even in this slice, 2 components of the potential were observed as in the intact cortex. The durations of the first and the second waves were about 10 msec and 150 msec, respectively. The second component had a higher threshold and a longer refractory period (more than 5 sec) than the first component. When the slice was inverted, the second as well as the first waves completely reversed in polarity.

The first component of the direct cortical response has been considered to represent the depolarization in the distal portion of the apical dendrites[2,3]. The observation mentioned above that the first component of the cortical response could be evoked in the slice composed of only the molecular layer is in accordance with this interpretation. The finding that the potential was reversed in polarity when the slice was inverted can be explained by assuming that the most proximal portion of the apical dendrites included in the slice was damaged during preparation of the slice and became inactive, thus serving as the 'source' of the current which flows into the depolarized portion of the dendrites.

As for the second component, the results obtained in the present experiments do not support the interpretation



A, potential evoked in vitro in a cortical slice by direct stimulation. The potential consists of 2 negative waves. Upward deflection indicates negative. B-1, histological section of the slice from which record A was obtained. The slice was composed of the molecular layer alone. Compare B-1 with a histological section of the normal cortex in B-2.

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hitherto accepted that the second component represents summated action potentials of the intracortical interneurons[1]. The interneurons found in the molecular layer are only the horizontal cells of Cajal which are scattered so sparsely that no appreciable field potentials are expected to be produced by them[2]. Therefore, the second wave cannot be due to the summated action potentials of the intracortical interneurons. The finding that the wave reversed in polarity when the slice was inverted indicates that, like as the first component, the second wave reflects activity developed in the distal portion of the apical dendrites.

This is the first experiment in which electrical response was successfully recorded from the slice prepared from the mammalian neocortex and incubated in the artificial medium. McILWAIN et al. and HILLMAN et al. reported that they were unable to evoke any potential change in the slice in response to a single shock[4,5]. While in their experiments the slice was 0.35 mm thick, in the present experiments the slices 0.2 mm thick were used. We, too, failed to produce electric activity in the slices 0.35 mm thick. Therefore, their negative results may be accounted for by considering that their slices were too thick to maintain physiological activities in the artificial medium[6].

Résumé. Pour examiner l'origine de la réponse corticale par stimulation directe, le potentiel produit dans la mince section corticale a été étudié. Dans la tranche qui se compose seulement de la couche moleculaire, la configuration de la réponse a été la même que celle qui a été suscitée dans le cortex intact. La propriété du potentiel indique que non seulement les ondes initiales rapides mais aussi les ondes secondaires retardées ont atteint la portion éloignée des dendrites apicalaux.

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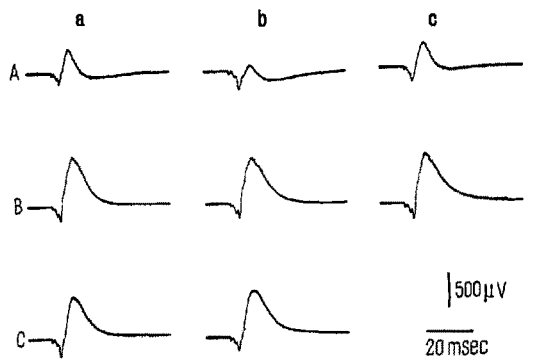
Effects of γ-amino-butyric Acid on the Potentials Evoked in vitro in the Superior Colliculus

Since BAXTER and ROBERTS reported that the superior colliculus contained a conspicuously large amount of γ-aminobutyric acid (GABA)[1], it has been presumed that GABA may play an important role in impulse transmission in this structure. In the present experiments, we prepared thin slices from the superior colliculus of guinea-pig and studied effects of GABA upon electrical activities produced in the slices in vitro. It was found that GABA mimicked the action of the inhibitory transmitter in the superior colliculus.

The slice consisting of the superior colliculus and the incoming optic tract was prepared in the same manner as the slice from the cerebral cortex was usually made[2]. The thickness of the slice was 0.4–0.5 mm. The slice was incubated in a glucose-saline medium saturated with 95% oxygen and 5% carbon dioxide. Electric stimulation was applied to the optic tract with a pair of ball-tipped silver wires. The recording electrode was also a ball-tipped silver wire resting on the superior colliculus. The normal medium was composed of (final concentration) NaCl (124 m*M*), KCl (5 m*M*), KH_2PO_4 (1.24 m*M*), $MgSO_4$ (1.3 m*M*), $CaCl_2$ (2.6 m*M*), $NaHCO_3$ (26 m*M*) and glucose (10 m*M*). When the Cl-free medium was prepared, acetate or propionate ion was used to replace chloride ion.

As shown in Figure A-a, the potential induced in vitro in the superior colliculus by optic tract stimulation consisted of an initial small positive deflection and a late negative wave of higher amplitude. Usually, 2 negative spikes were superposed on the descending phase of the initial wave. In contrast to the potential recorded from the superior colliculus, the potential recorded from the optic tract was merely composed of the rapid action potentials of the incoming presynaptic axons and not accompanied by the late negative wave. Therefore, it may be concluded that the late negative wave represents the potential generated postsynaptically in the superior colliculus and the initial one reflects the action potential of the presynaptic axons in the optic tract.

Figures A–C came from an experiment in which effects of GABA were observed in the normal medium (A), in the Cl-free medium (B) and in the presence of strychnine (C). The stimulus strength and the arrangement of the electrodes were kept constant throughout the experiment.



Effects of GABA on the potentials evoked in vitro in the superior colliculus. All the records were obtained in an experiment in which arrangement of the electrodes and stimulus strength were kept constant. A, recorded in the normal medium, B, in the Cl-free medium and C, in the normal medium containing strychnine ($3 \times 10^{-5} M$). a, before application of GABA, b, 1 min after $2.8 \times 10^{-4} M$ GABA was added to the medium, c, 1 min after washing with normal medium (Figure A) or with Cl-free medium (Figure B). Note GABA was effective only in the normal medium. Upward deflections, negative.

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