structure, most probably of cortex, during sporogenesis is not identical with usual mechanisms of the cell wall synthesis during normal division.

The formation of some new enzymes during sporogenesis has already been described; and for the time being, it is not yet evident whether chloramphenicol specifically inhibits the formation of DAP-containing structure or the synthesis of some enzymes newly arising during sporulation and responsible or co-responsible for the synthesis of structures containing diaminopimelic acid.

Zusammenfassung. Während der Bildung der Praesporen wird der Einbau der ^{14}C-Diaminopimelinsäure durch Chloramphenicol (100 μg/ml) beträchtlich gehemmt und durch Penicillin (1000 E/ml) wenig erhöht.

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Mesencephalic Reticular Responses to Natural and to Repeated Sensory Stimuli

The purpose of this investigation was to evaluate the responsiveness of neurones in the Mesencephalic Reticular Formation to natural stimuli, and to study the effect of repetition of such stimuli.

Experiments were performed in cats either anesthetized with chloralose or immobilized with gallamine triethiodide. Spike activity of single neurones was recorded extracellularly with KCl-filled micropipettes placed stereotaxically. Natural stimuli of different modalities were tested: somatic, as light tapping of skin, brushing of hairs and clamping of toes; acoustic, as voices, clicks or claps; visual, as illumination with a weak flashlight or object movement in front of the eyes. More artificial stimuli as electrical shocks to subcutaneous tissues of pads, flashes and tones were used also. Stimuli were tested as frequencies between 0.05 and 10 c.p.s.

Findings can be summarized as follows: (i) A high percentage of reticular neurones responded well to natural stimuli (Figure 1). The set of natural excitations that influenced each unit varied greatly from cell to cell: variations involved the effective modalities (somatic only, acoustic only, somatic and visual, etc.); the most effective type within each modality (skin tapping, hair brushing, etc.) and, at least for the somatic sphere, the receptive field for each type (fields could be localized, widespread, or discontinuous).

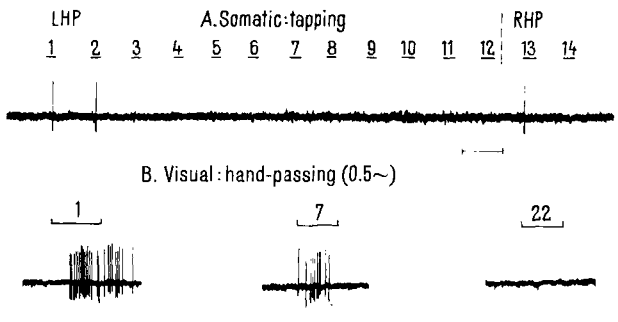

Fig. 1. *Convergence of natural stimuli and specific attenuation.* Unit activity in Mesencephalic Reticular Formation; lines above tracing indicate stimuli; numbers above bars indicate position of stimulus within the sequence. A, Taps. The unit responded to the initial (1, 2) but not to the subsequent (3–12) taps to the left hindpaw (LHP) (attenuation); tap 13 to the right hindpaw (RHP) was effective (specificity). B, hand passing in front of eyes. Initial effectiveness and subsequent attenuation.

(ii) Reticular units failed to 'follow' even low frequencies (i.e. failed to respond to every stimulus of a train) (Figure 2B): Figure 2A indicates that the maximal following rates for somatic excitations fell within the 0.2 to 10 c.p.s. These rates could not be forced outside the stated range, and in some cases could not even be modified by large increases in stimulus intensity. When a cell responded to different stimuli, as a tap to the skin and a click (or to different localization of the same stimulus, as a tap to the forepaw and to the hindpaw), the maximal following rates for each excitation (or for each placement) could be dissimilar but, in every case, remained within the same low frequency range (Figure 2B).

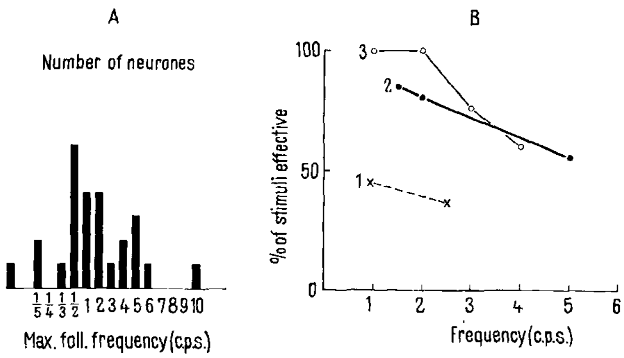

Fig. 2. A, *maximum following rates.* Histogram (bar on far left indicates one neurone). B, *following capacity in a single mesencephalic reticular unit.* On abscissae, stimulus frequency in c.p.s.; on ordinate, percentage of stimuli that were effective within a train of a given frequency for claps (curve 1), light taps to nose (curve 2) and shocks to pad of left hindpaw (curve 3).

(iii) The response of a high proportion of cells showed attenuation on repetitive application of a stimulus (natural or artificial): the term 'attenuation' implies that the effect of the first few shocks was clear but that of subsequent shocks was reduced and eventually perhaps absent (Figure 1). The response reappeared after a period without stimulation. The remaining cells did not attenuate, but equilibrated; in this case the proportion of stimuli evoking a response remained constant throughout a prolonged train. The time course of attenuation could be influenced by the modality, type, intensity and localization of the stimulus, but in most of the units even marked changes in these parameters did not convert attenuation into equilibration.

Attenuation was usually specific: after a cell had become unresponsive to a repeated stimulus, it would be unresponsive also to similar stimuli (generalization) but retain its reactivity to sufficiently different excitation (Figure 1). The degree of dissimilarity necessary to evoke a response varied: in some cells a shift of a few centimeters of the point of stimulation sufficed; in most, generalization was more marked and the response could be evoked only by a stimulus of a different modality. The relationship was commonly reciprocal: if a cell responded to B after attenuation of A, it would respond to A after attenuation of B.

Results can be discussed from two view points. From that of the general susceptibility of reticular units to sensory stimuli, these experiments suggested that certain concepts should be broadened. Firstly, the notion of reticular responsiveness should include susceptibility to sensory stimuli which are natural and complex, as opposed to the more currently used shocks, flashes, etc., which are less so. Secondly (and as pointed out by AMASSIAN and DE VITO[1]), the notion of exclusively widespread receptive fields should be substituted by the recognition of many varieties, including some that are quite restricted (e.g. to the digits of one paw). Thirdly, the notion of convergence of different modalities upon single neurons should take into account cells which respond to several weak and complex natural stimuli (e.g. light brushing, illumination and voice); in certain cases the latter were effective only within limited receptive fields, as in the case of a unit sensitive to tapping only on the left foreleg and part of the thorax and to hand passing only in the left visual field. The complexity and variety of these sensory response patterns at cellular level resist theorizing as to the function of these units as a coordinated whole.

From the point of view of repetitive stimulation, low following frequencies and attenuation were outstanding. This behavior reflected a type of responsiveness different from that of primary sensory systems where high following rates and equilibration are the rule (for work on unanesthetized preparations see [2–4]). These features of reticular activity may be shared by units in other areas: e.g. recent experiments have indicated that low rates and attenuation are found in certain cells of the somatic sensory cortex[5].

With regard to attenuation, one is struck by the similarities (effectiveness of a stimulus when novel, decay on repetition, specificity, etc.) between it and habituation; the actual relationship, however, cannot be stated more precisely without further experimentation[6].

Résumé. L'activité des neurones de la formation réticulaire mésencéphalique du chat est modifiée par l'effet de stimuli physiologiques, quelque fois très complexes: la convergence hétéro-sensorielle est très évidente et les champs récepteurs ont différentes étendues et distributions. Soumises à de hautes fréquences de stimulation, les cellules présentent une réactivité limitée. Au fur et à mesure que la stimulation est répétée, les réponses diminuent et, finalement, disparaissent; cette diminution de réactivité est souvent spécifique de la stimulation utilisée.

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Nuclear and Radicular Distribution of Cardio-Inhibitory Neurons

Cardio-inhibitory fibres have been traced into the cardiac branches of the vagus nerve from both the vagal and the bulbar-accessory roots[1,2]. Since the vagal and the bulbar-accessory components show similar functional, reflex properties[3], and parallel patterns of peripheral distribution to the nodal structures of the heart[2], a systemic organization of the two sets of neurons within the dorsal motor nucleus and the radicular output is presumptive. The radicular distribution of the cardio-inhibitory effects has therefore been investigated, in comparison with that of viscero-motor effects, which represent the most extensive output of the dorsal motor nucleus through the vagal root; and the two populations of cardio-inhibitory neurons have been localized according to the distribution of the retrograde changes following chronic section of either vagal or bulbar-accessory cardio-inhibitory rootlets.

The experiments were carried out on 21 adult dogs (7–10 kg). In 9 animals, anaesthetized with chloralose (80 mg/kg), the trachea was cannulated and the vago-accessory roots were exposed bilaterally by opening largely the posterior fossa: on one side the rootlets were sectioned and stimulated (peripheral stump) with small, bipolar, silver electrodes, in groups or one by one; on the other side, to rule out possible current diffusion effects, the dorsal motor nucleus was stimulated with stereotaxically placed, concentric electrodes, and the vago-accessory rootlets were interrupted in sequence.

Femoral blood pressure and the average changes in the intraluminal pressure of the digestive tract (upper and lower oesophagus, stomach and duodenum) were routinely recorded by means of two Samborn pressure transducers connected to a femoral catheter or to an air-filled rubber balloon, respectively, and coupled with a Samborn Twin-Viso recorder through carrier pre-amplifiers.

In 12 animals the intracranial section of different groups of rootlets was carried out, unilaterally, under pentothal anaesthesia and with full aseptic precautions, and the cardio-inhibitory and viscero-motor effects, obtained 3 weeks later by the electrical stimulation of the normal or partially degenerated vagal trunk (peripheral stump), were comparatively analysed and related to the distribution of the retrograde changes following the chronic radicotomy, occurring within the dorsal motor nucleus (serial, Nissl-stained, cross sections of the medulla).

The following results were obtained: (i) Intracranial stimulation of the bulbar-accessory root was found to

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