aussi bien chez les crabes épédonculés que chez les individus normaux. La différence entre les contrôles et ceux qui ont reçu de la sérotonine est hautement significative ($P < 0,01$). L'injection de 0,2 cm³ d'une solution de 5-HT 0,001% entraîne encore une hyperglycémie mais moins élevée: 35,75 mg/100 cm³ de sang.

Tableau I

| Conditions expérimentales | Nombre de mesures | Glycémie mg/100 cm³ | Standard deviation | Standard error |
|---|---|---|---|---|
| Normaux | 22 | 13,68 | 4,41 | 0,98 |
| Normaux + aqua dist. | 8 | 21,00 | 8,21 | 2,89 |
| Normaux + 5-HT | 14 | 64,00 | 22,91 | 6,12 |
| Epédonculés | 6 | 13,66 | 5,12 | 2,09 |
| Epédonculés + 5-HT | 5 | 66,80 | 19,27 | 8,60 |

Tableau II

| Glucose sanguin mg/100 cm³ avant injection | Glucose sanguin mg/100 cm³ après injection 5-HT |
|---|---|
| 1,6 | 38 |
| 3,2 | 24 |
| 3,2 | 41,5 |
| 4,6 | 35 |
| 4,8 | 38 |
| 4,8 | 40 |

La méthode de HAGEDORN et JENSEN dose en fait la totalité des substances réductrices du sang; pour vérifier que dans le cas présent il s'agissait bien d'une élévation du taux de glucose, la glycémie d'un groupe de 6 crabes a été mesurée avant et 1 h après l'injection de 0,2 cm³ de 5-HT 0.1% par la méthode de la glucose oxydase[14]. L'hyperglycémie qui suit l'injection est très nette ($P < 0.01$), quoique les chiffres absolus soient inférieurs à ceux obtenus par la méthode de HAGEDORN et JENSEN (Tableau II).

Nous ajouterons que les mélanophores ponctuels de *Carcinus* épédonculés répondent nettement à la sérotonine, en étalant leurs granules de mélanine, ce qui cause un assombrissement général de la carapace. Ceci étend donc les résultats obtenus sur les érythrophores et les leucophores des *Natantia* à un autre type de chromatophores et à une autre catégorie de crustacés, les *Reptantia brachyura*.

Ces données confirment le parallélisme entre l'action de la sérotonine et des sécrétions pédonculaires et permettent d'envisager l'intervention, directe ou indirecte, de la 5-HT dans le contrôle hormonal de la glycémie et des chromatophores chez les crabes.

*Summary*. Injection of 0.2 cm³ of 5-HT 0.1% in *Carcinus maenas* has a powerful hyperglycaemic effect and determines at the same time a dispersion of the melanin granules in chromatophores of eyestalkless crabs. In both instances, 5-HT mimics the effects of the injection of an extract from the eyestalks.

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## Presynaptic and Postsynaptic Inhibition on Transmission of Cutaneous Afferent Volleys Through the Cuneate Nucleus During Sleep[1]

The modulation during sleep of the orthodromic lemniscal response elicited by single shock stimulation of the superficial radial nerve was investigated in unrestrained, unanaesthetized cats. The mechanisms responsible for the changes in the synaptic transmission occurring at the level of the dorsal column nuclei during sleep were also investigated. In particular, the excitability changes of the cutaneous terminals in the cuneate nucleus were studied by recording monophasically the antidromic discharge in the superficial radial nerve following WALL's method[2], while the excitability of the cuneate cells was tested by recording the lemniscal response to direct electrical stimulation of the cuneate nucleus.

*Methods*. The electroencephalogram (EEG), the electromyogram of the posterior cervical muscles (EMG) and the electro-oculogram (EOG) were recorded through chronically implanted electrodes in 11 cats. A collar-type electrode was applied to the left superficial radial nerve and a bipolar recording electrode was introduced into the right medial lemniscus at mesencephalic level. In addition a stainless steel microelectrode (300 KΩ–1 MΩ) was inserted, chronically, into the left cuneate nucleus, following a procedure already adopted in the unrestrained cat for testing the excitability changes of the α-motoneurones[3] and of the primary afferents in the spinal cord[4]. The experiments started 1–2 days after the implantation of the electrodes. Rectangular pulses 0.05 msec in duration, with repetition rates of 1/1.5–2.0 sec were used for

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bipolar stimulation of the superficial radial nerve or for unipolar stimulation of the cuneate nucleus.

*Results.* (1) The evoked potentials recorded from the medial lemniscus on single shock stimulation of the superficial radial nerve were not modified during transition from relaxed wakefulness to synchronized sleep, nor was any significant difference observed between the spindles and the interspindle lulls. During the desynchronized sleep the amplitude of the lemniscal discharge was also not affected when the REM were absent. A phasic depression of the lemniscal response appeared, however, during the bursts of REM (Figures 1 and 2). The more intense the REM burst, the more profound was the depression of the response.

(2) The antidromic group II volley elicited antidromically in the superficial radial nerve by single shock stimulation of the ipsilateral cuneate nucleus[5] was not modified during relaxed wakefulness, synchronized sleep and desynchronized sleep. A phasic enhancement of this response occurred, however, during the bursts of REM (Figure 2). This increased excitability of dorsal column fibres may be explained with presynaptic depolarization of the terminals of the primary afferents within the cuneate nucleus, an effect leading to presynaptic inhibition.

(3) Single shock stimulation of the cuneate nucleus elicited in the contralateral medial lemniscus an initial brief positive potential ($\alpha$-spike) followed by a more prolonged positive potential ($\beta$-spike). The $\alpha$-spike is due to impulses generated by direct stimulation of cuneate neurones or their axons, while the late $\beta$-spike can be attributed to direct stimulation of presynaptic fibres leading to synaptic activation of cuneate neurones[6]. There was no tonic change of cuneate cell excitability during relaxed wakefulness, synchronized sleep or desynchronized sleep.

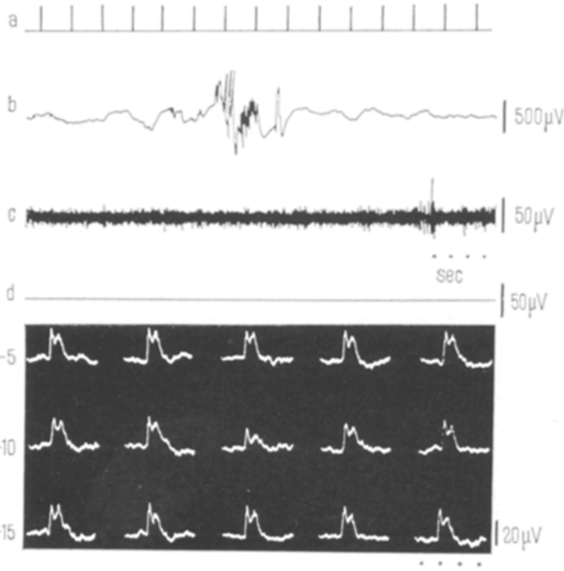


Fig. 1. Phasic depression of the lemniscal response elicited by cutaneous nerve stimulation during a burst of REM of desynchronized sleep. a, Signals of 15 stimuli applied to the left superficial radial nerve; b, EOG; c, EEG; d, EMG of the posterior cervical muscles (ink-writer). The 15 CRO responses of the right medial lemniscus to the shocks applied to the cutaneous nerve were recorded before (1–5), during (6–10) and soon after (11–15) the outburst of REM. Response 7, recorded at the beginning of the outburst, is not decreased, while response 8, occurring in the middle of the outburst, is strikingly depressed.

Only during the bursts of REM was there a phasic depression of both the $\alpha$- and $\beta$-spikes (Figure 2). The reduction in amplitude of the $\alpha$-spike during the REM indicates a phasic depression of the direct excitability of these cuneate neurones, an effect which might be attributed to postsynaptic inhibition. The additional mechanism of presynaptic inhibition, however, contributes to the phasic depression of the $\beta$-spike during the REM.

It is concluded that both presynaptic and postsynaptic inhibition affect the cuneate nucleus during the bursts of REM. They contribute to the phasic depression during the REM of the orthodromic response evoked in the medial lemniscus by a cutaneous afferent volley.

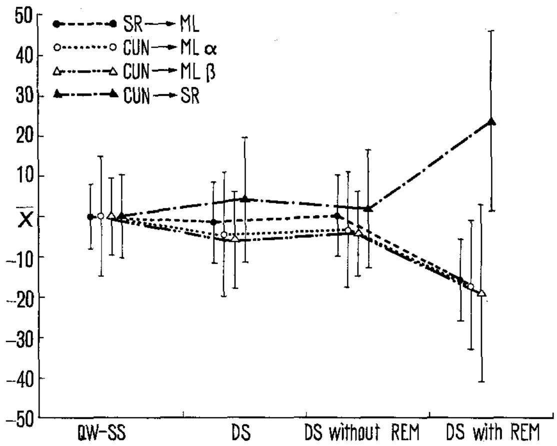


Fig. 2. Effects of sleep on the orthodromic lemniscal response and on the excitability both of cuneate neurones and of the presynaptic terminals in the cuneate nucleus. Filled circles: orthodromic responses recorded from the right medial lemniscus (ML) on single shock stimulation of the left superficial radial nerve (SR). Open circles and open triangles: responses recorded from the right ML on single shock stimulation of the left cuneate nucleus (CUN). The initial $\alpha$-spike and the later $\beta$-spike due to direct and synaptic excitation of cuneate neurones have been plotted with different symbols. Filled triangles: antidromic responses recorded from the left SR on single shock stimulation of the CUN. The average values of measurements during desynchronized sleep (DS) are calculated as percentage of the mean control values ($\bar{X}$) during quiet wakefulness-synchronized sleep (QW-SS). The vertical segments represent the standard deviations. The responses during DS have been further divided into two groups: (i) the responses recorded during the intervals between the REM (DS without REM), and (ii) the responses recorded during the large bursts of REM (DS with REM).

*Riassunto.* Durante i movimenti rapidi oculari caratteristici della fase desincronizzata di sonno si osserva una depressione fasica della risposta lemniscale alla stimolazione di fibre cutanee. Questa modulazione ipnica della risposta lemniscale è dovuta a meccanismi di inibizione presinaptica e postsinaptica.

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