ing other portions of the hypophysis as well as the hypothalamus and more dorsal brain regions (Figure 1). Although the animals bearing hypophyseal tumors did not have apparent tumors in other organs, 2 of the animals lacking hypophyseal hyperplasia had mammary tumors (1 unoperated and 1 pinealectomized), and a third had an ovarian tumor (pinealectomized). The sole well-preserved hypophyseal tumor of an unoperated rat was a chromophobe adenoma consisting of relatively solid masses and cords of small parenchymal cells (Figure 2). The hypophyseal tumors of the pinealectomized rats were at least partly chromophilic, having scattered or regional masses of larger parenchymal cells with more cytoplasm which sometimes stained weakly to moderately with the periodic acid-Schiff technique (Figure 3). No aldehyde fuchsin-positive cells were found in these tumors, although small numbers of them were seen in anterior lobes of non-tumorous animals. These chromophilic adenomata were characterized also by having a greater blood content, localized in large and irregular channels between the usually slender strands of parenchymal cells. These features of the tumors in the pinealectomized rats are not necessarily referable to the absence of the pineal, since such features of apparently similar tumors have been noted in normal old female rats by other investigators. Nevertheless, further investigation of the effect of pinealectomy on the cytology of hypophyseal tumors is needed, particularly with the use of a large number of animals and quantitative examination of a tendency to develop tumor parenchymal cells of a more chromophilic and differentiated type. With the available results neither the incidence nor the characteristics of the hypophyseal tumors appear to be distinguished significantly or certainly in the pinealectomized animals.

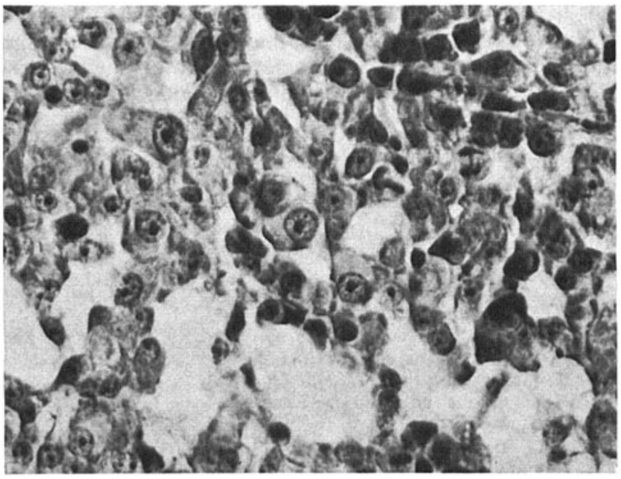


Fig. 3. Typical area in chromophilic hypophyseal adenoma of a pinealectomized rat. Note the slender strands of parenchymal cells between the vascular channels. Compare with Figure 2. Both Figures are from the same magnification. Periodic acid-Schiff and hematoxylin.

Zusammenfassung. Es wurden Vorkommen und Eigenschaften des Hypophysenadenoma bei altersschwachen Ratten nach Pinealektomie beschrieben. Trotzdem in Tumoren zirbeldrüsenloser Tiere grössere Parenchymbildung und grösserer Blutgehalt erscheinen, können die vorliegenden Ergebnisse keinen entscheidenden Unterschied bestätigen.

W. B. Quay

Department of Zoology, University of California,
Berkeley (California 94720, USA),
September 14, 1966.

Influence of Long-Lasting Stimulation of the Caudate Nuclei on Sleep Cycle in Rats

It was shown previously, that before the onset of the rhombencephalic sleep phase (RP) a gradual decrease in the excitability of the reticular activating system (RAS) develops[1] and that the onset of RP may be delayed by subthreshold stimulation of the mesencephalic reticular formation during the telencephalic sleep phase (TP)[2]. The question solved in this paper is whether stimulation having an inhibitory effect on the brain (mainly on RAS)[3] may shorten the duration of the TP.

Bipolar electrodes were implanted in the frontal cortex, dorsal hippocampus, and caudate nucleus bilaterally in 8 rats. The length of different parts of the sleep cycles (Figure) was measured from 22 all-day (0900–1600) recordings in freely moving animals placed in a dimly illuminated sound-proof chamber. The recording was performed repeatedly 2 or 3 times on every rat either with or without all-day synchronous stimulation of both caudate nuclei with single rectangular pulses (duration 0.5 msec, repetition rate once every 2 or 3 sec). The amplitude of the pulses was chosen individually; they were capable of evoking at the beginning of stimulation in the waking state clear-cut caudate spindles[3] (however, this phenomenon soon disappeared as a consequence of repetition of stimulation). In some cases we started with recordings during stimulation and continued with control recordings the next day, in others vice versa.

Evaluation of the results (Figure) shows that stimulation of the caudate nuclei evokes a slight but statistically significant decrease in the duration of the TP. The length of RP and arousal reaction occurring in rodents regularly after the RP was not changed.

The cyclic nature of sleep is a characteristic feature of mammals[4]. In physiological conditions sleep always

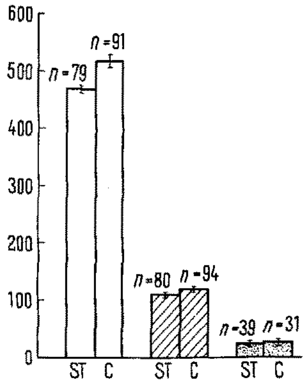
---

[1] E. Roldán, T. Weiss, and E. Fifková, Electroenceph. clin. Neurophysiol. *15*, 775 (1963).

[2] T. Weiss and E. Roldán, Boln. Inst. Estud. Méd. biol. Univ. nac. Méx. *22*, 1 (1964).

[3] G. Heuser, N. A. Buchwald, and E. J. Wyers, Electroenceph. clin. Neurophysiol. *13*, 519 (1961).

[4] M. Jouvet, Archs ital. Biol. *100*, 125 (1962).



Duration of different parts of the sleep cycle in rats without (C) and with stimulation (ST) of the caudate nuclei. White columns: duration of telencephalic sleep phase in sec (measured from the end of one rhombencephalic sleep phase to the beginning of the following one); hatched columns: rhomboencephalic sleep phase (measured with respect to the onset and termination of the regular theta activity in the hippocampi); black columns: arousal reaction following immediately after rhombencephalic sleep. Average values with S.E. of the mean; *n*: number of measurements in the group.

starts with TP, which is followed by RP. The gradual desactivation of the RAS during TP seems to be one of the necessary conditions for the onset of RP. The intrinsic process of reticular desactivation might be influenced to some extent by stimulation of the caudate nuclei. This stimulation can influence the excitability of the brain without visible changes in the sleeping EEG (the caudate spindles recorded at the cortex disappear at the beginning of stimulation).

Zusammenfassung. Die telencephalische Schlafphase der Ratte kann bei lang dauernder elektrischer Nucleus-caudatus-Reizung deutlich verkürzt werden.

T. R. WEISS

Laboratory of Neurocybernetics, Institute of Physiology of the Czechoslovak Academy of Sciences, Prague (Czechoslovakia), July 27, 1966.

Variability Within and Between Strains for Mating Behaviour Parameters in *Drosophila pseudoobscura*

SPIESS and LANGER[1] demonstrated variable mating speeds for homokaryotypes in *D. pseudoobscura*, and KAUL and PARSONS[2] confirmed this for Standard (ST) and Chiricahua (CH) homokaryotypes. Both experiments showed ST homokaryotypes to have a faster mating speed than CH, in spite of differences in experimental technique. KAUL and PARSONS' results were based on single pair matings, which made it easy to obtain data for duration of copulation also. The strains used by KAUL and PARSONS were derived by intercrossing 3 ST and 3 CH strains collected at Mather, California by Prof. TH. DOBZHANSKY in 1959. In view of the evidence of EHRMAN[3], who showed the development of sexual isolation between 6 population cages of *D. pseudoobscura* set up from the same initial population, after a period of 4 years and 5 months of isolation, it seems reasonable to enquire into the possibility of behavioural differences in the original 3 ST and 3 CH strains.

The experimental procedure consisted of 50 single pair matings for each of the 6 strains repeated for 3 trials, so giving a total of 150 observations per strain. In Table Ia, the number of matings out of 50 in 5 min with totals and mean mating speeds are given for each strain. It is clear that there is *substantial* variability between strains but little between trials, as is confirmed by an analysis of variance (Table Ib) on the proportions mated out of 50 in 5 min after applying the angular transformation[2,4]. This means that observations published previously[1,2] probably represent more or less the average situation, depending on how many strains were used to set up the experimental cultures. It is interesting, too, that although ST has been reported to have a greater mating speed than CH[1,2], one of the ST strains has the slowest mating speed of all.

Table Ia. Numbers mating in 5 min out of 50 for ST and CH strains, with mean mating speeds calculated as in KAUL and PARSONS[2]

Strain	ST-1	ST-2	ST-3	CH-2	CH-5	CH-6
Trial I	9	37	38	10	32	31
II	8	28	15	15	27	24
III	6	42	28	10	15	27
Total	23	107	81	35	74	82
Mean mating speed (min)	110	2.4	4.0	17	5.1	4.0

Table Ib. Analysis of variance for ST and CH strains

Karyotype	ST			CH	
	Degree of freedom	Mean square	Variance ratio	Mean square	Variance ratio
Strains	2	968.3	14.42[b]	307.4	7.45[a]
Trials	2	143.7	2.14	52.9	1.28
Error	4	67.2		41.3	

[a] $P < 0.05$. [b] $P < 0.01$.

---

[1] E. B. SPIESS and B. LANGER, Proc. natn Acad. Sci., USA *51*, 1015 (1964).

[2] D. KAUL and P. A. PARSONS, Heredity *20*, 381 (1965).

[3] L. EHRMAN, Genet. Res. *5*, 150 (1964).

[4] P. A. PARSONS, Genetica *35*, 141 (1964).