instead, and 7 of each then had 2% KCl solution as the sole drinking fluid. Animals were killed on the 6th, 7th or 8th day, as shown in the Table, from which it will be seen that the time of killing is irrelevant to the general conclusions, and further discussion will be based on the pooled results of each of the 3 experimental and 3 control subgroups. Body weight and fluid intake were measured daily. After killing, kidneys were fixed immediately in 10% formol saline (4% formaldehyde and 0.9% NaCl in water) or Helly's solution, and stained with phosphotungstic acid haematoxylin[9] or by Bowie's method[10]. The juxtaglomerular granule (JG) indices were calculated as in our previous study. The method of fixing and staining was found not to affect the indices.

From the Table certain general conclusions may be drawn. (a) Rats without adrenals drank significantly less hypertonic NaCl solution in both periods of the experiment than did the control animals. This differs from the findings of RICHTER[15] who, however, offered a free choice of tap water and 3% NaCl solution. (b) Both the control and experimental animals, whether receiving water or 2% KCl solution, drank significantly less during days 5–8 than did those continuing to received NaCl. (c) Among the adrenalectomized rats, but not the controls, those receiving water or KCl solution during days 5–8 had JG indices significantly lower than had rats continuing to drink the NaCl solution. (None of the control groups is precisely comparable with the adult rats in our earlier experiments[9]. This is not only because of differences in the programme of cation loading and time of killing, but also because the earlier studies did not involve trauma.)

In the interpretation of changes in the JG index, it is to be borne in mind that an increase in the amount of secretory material in a cell may be caused by a recent decrease in the rate of discharge, or by a long-term increase in activity. The converse alternatives are presented by a fall in the content of secretory material. In our previous experiments[9] and in most published studies on JG cells, one is probably dealing with chronic changes in granularity, having the same sense as the changes in activity causing them. In the present studies, however, in which only 4 days elapsed after a change in cation intake, it is not clear whether increased granularity means increased activity, or is the first effect of a decreased rate of discharge.

However, whatever the interpretation of the differences in JGI, when adrenalectomized rats given NaCl in their drinking water are compared with those given KCl or neither, the results permit the clear conclusion that differences in cation intake can lead to differences in the juxtaglomerular granule cell index without the mediation of the adrenal cortex[16].

Résumé. Chez les rats adrénalectomisés, une différence très nette de l'indice de la granularité juxtaglomérulaire est apparue entre les animaux qui avaient bu du 2% NaCl et ceux qui avaient reçu ou de l'eau distillée ou du 2% KCl. Il y a donc une réactivité juxtaglomérulaire, indépendente du cortex surrénal.

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[15] C. P. RICHTER, Am. J. Physiol. *115*, 155 (1936).

[16] The authors thank the Medical Research Council for apparatus used in these experiments.

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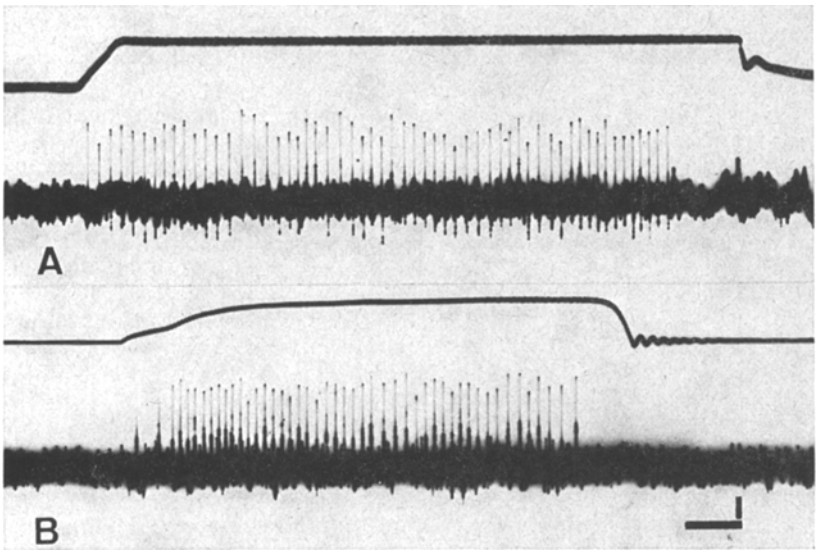
Masticatory Proprioception in Reptilians (*Caiman sclerops*)

The cells of the mesencephalic trigeminal nucleus represent the first-order neurons of the afferents from spindles of masticatory muscles in mammals and birds[1–6]. The mesencephalic nucleus of the fifth cranial nerve of mammals consists of a column of unipolar cells which extends from the trigeminal motor nucleus up to the posterior commissure[7]. In birds the mesencephalic trigeminal nucleus is characterized by cells localized in the thickness of the tectum and in the posterior commissure[7,8]. Quite different is the organization of the mesencephalic nucleus of the trigeminus in reptilians; in fact, there are 2 cellular pools, the former in the thickness of the tectum and the latter located in a paracommissural position[7,9,10]. While the function of the trigeminal mesencephalic nucleus in mammals and birds is well known, no physiological investigations have been performed in reptilians on the possible role of this nucleus in the masticatory proprioception.

Our experiments were carried out in 35 curarized *Caiman sclerops*. The unitary discharge of the mesencephalic nucleus was recorded by means of tungsten microelectrodes using local anaesthesia and artificial respiration. The effects of lowering the jaw or of stretching the isolated masseter muscle were thus investigated in 28 units obtained from 22 localizations of the recording microelectrode tip in the mesencephalic trigeminal nucleus. 19 locations were in the thickness of the tectum and 3 in a paracommissural pool. All the explored units, silent in resting conditions, were selectively activated with a very short latency (2–5 msec) either by lowering the jaw (Figure A) or by a moderate stretching of the ipsilateral masseter muscle (Figure B).

The discharge frequency of the units in the stretching of the masseter was at the beginning of 120/sec; then it

[1] G. B. AZZENA and G. PALMIERI, Expl. Neurol. *18*, 184 (1967).
[2] R. BORTOLAMI and A. VEGGETTI, Riv. Biol. *60*, 325 (1967).
[3] S. COOPER, P. M. DANIEL and D. WHITTERIDGE, J. Physiol., Lond. *120*, 471 (1953).
[4] K. B. CORBIN, J. comp. Neurol. *73*, 153 (1940).
[5] E. MANNI, R. BORTOLAMI and G. B. AZZENA, Expl. Neurol. *12*, 320 (1965).
[6] J. SZENTAGOTHAI, J. Neurophysiol. *11*, 445 (1948).
[7] C. U. ARIENS KAPPERS, G. C. HUBER and C. CROSBY, *The Comparative Anatomy of the Nervous System of Vertebrates Including Man* (Hafner, New York 1960).
[8] A. VEGGETTI and G. PALMIERI, Riv. Biol. *58*, 93 (1965).
[9] G. PALMIERI and A. VEGGETTI, Riv. Biol. *61*, 563 (1968).
[10] A. VEGGETTI and G. PALMIERI, Sperimentale, *119*, 1 (1969).



Responses of mesencephalic trigeminal cells to lowering the jaw (A) and to stretching the left masseter muscle (B). In A the record was taken from the left paracommissural pool and in B from the ipsilateral tectum. Upper beam: Mechanogram. Lower beam: trigeminal unitary discharge. Time: 100 msec. Voltage: 100 μV.

settled down to 60–70/sec and ceased as soon as the stretch was released (Figure B). However, when the jaw was lowered the increase in discharge rate of the units during the initial portion of the response did not occur in all the experiments (Figure A). This probably depended upon the fact that the stretching of the masseter was not so quick and sudden as when the muscle was isolated (Figure B). The unitary discharge elicited by the masseterine stretch was blocked during electrically induced contraction of that muscle: this showed that the record was taken from the muscle spindle afferents[11]. The units influenced by lowering the jaw or by the masseterine stretch were unaffected by the stimulation of other trigeminal receptors (face, cornea, teeth, palate).

The present results extend and confirm the anatomical investigations of VEGGETTI and PALMIERI[10] who observed cromatolysis of the trigeminal mesencephalic nucleus cells after cutting the ipsilateral mandibular branch, and degeneration of the masseterine spindles following the destruction of the ipsilateral posterior commissure in *Caiman sclerops*. Thus, the conclusion can be reached that also in reptilians the cells of the mesencephalic trigeminal nucleus represent the first-order neurons of the afferents from the masseterine spindles as is the case for birds and mammals.

Riassunto. Mediante microelettrodi di tungsteno si é registrata l'attività unitaria del nucleo mesencefalico del trigemino in *Caiman sclerops* curarizzato. Le cellule di questo nucleo, silenti in condizioni di riposo, vengono attivate dall'abbassamento della mandibola e dallo stiramento del muscolo massetere omolaterale. Le risposte sono del tipo indotto da fusi neuromuscolari.

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e di Anatomia Veterinaria dell'Università di Sassari,
Sassari (Italy), 10 October 1969.

[11] P. B. C. MATTHEWS, Physiol. Rev. *44*, 219 (1964).

Light Refractive Emergence Rhythm in the Leafcutter Bee, *Megachile rotundata* (F.) (Hymenoptera: Apoidea)

The emergence rhythm of *Drosophila pseudoobscura* Sturtevant is light entrained when exposed to 15 min light signals of about 100 ft-c[1], and although weaker in effect, entrainment may also be achieved through temperature change[2]. Circadian oscillations may be readily entrained in poikilotherms by temperature[3] but each of those species studied is more sensitive to entrainment by a LD cycle. Experiments on the leafcutter bee, *Megachile rotundata* (Fabr.), suggest that the emergence rhythm in this species is unresponsive to light.

M. rotundata is a solitary species which diapauses as a prepupa in a dense, tightly spun cocoon, enclosed in a cell composed of one or more layers of leaf cuttings, which in turn is secreted in a light-tight cavity or hole. The prepupae may be maintained in diapause (at approximately 7 °C) for as long as 2 years and diapause can be broken by incubating the prepupae at temperatures above 17 °C[4]. First emergence will begin about 15 days after a diapausing population has been transferred to 32 °C and emergence will continue for about 10 days thereafter. As the bee chews through the cell in the photophase of the LD regime, which usually takes a matter of minutes, it is exposed to light for the first time.

[1] C. S. PITTENDRIGH, Proc. natn. Acad. Sci. *40*, 1018 (1954).
[2] V. G. BRUCE and C. S. PITTENDRIGH, Am. Naturalist *91*, 179 (1957).
[3] W. F. ZIMMERMAN, C. S. PITTENDRIGH and T. PAVLIDIS, J. Inst. Physiol. *14*, 669 (1968).
[4] W. P. STEPHEN and C. E. OSGOOD, J. econ. Ent. *58*, 218 (1965).