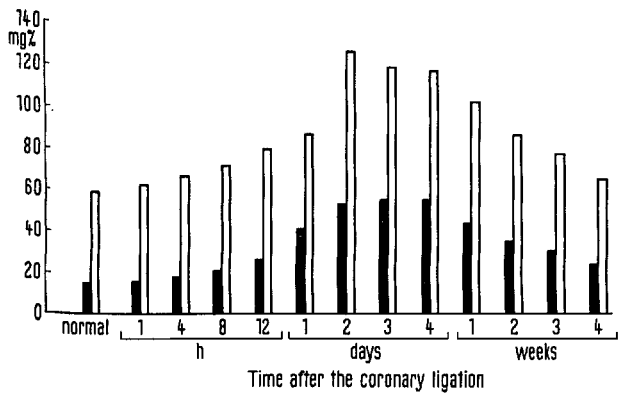
between 17–38 mg% 12 h after the operation and increased up to the third day when the values ranged between 45–67 with a mean value of 54 mg%, as compared to the normal value of 15 mg%. After showing a slight decrease, the serum levels of these acid soluble desoxy-ribose compounds after 4 days remained considerably higher even after 4 weeks of the operation, with the range of 16–34 mg%.



Serum concentration of desoxy-ribose compounds after the production of experimental myocardial infarction by two stage coronary ligation in dogs up to 4 weeks. Solid bars represent acid soluble desoxy-ribose compounds and blank bars acid insoluble desoxy-ribose compounds. The height of every bar represents the mean value obtained from 10 animals and the extreme left bars show control values obtained from 10 normal animals.

The acid insoluble desoxy-ribose compounds also increased and the maximum concentration was observed on the second day ranging from 98–146 mg%. The concentration after 1, 2, 3 and 4 weeks ranged between 73–134, 67–116, 54–101 and 47–89 mg%. Concentration of the desoxy-ribose compound both of soluble and insoluble products are increased greatly and remain higher at least up to 4 weeks after the production of experimental myocardial infarction, possibly due to the leakage from the nuclei of the cells of the infarcted area of the heart. Further work would establish the concentration of such compounds in the infarcted area of the heart tissue itself[4].

Zusammenfassung. Es wird nachgewiesen, dass eine koronare Unterbindung am Hund zu erhöhter Desoxyriboseverbindung im Serum führt.

PAWAN S. CHAUHAN[5] and R. B. ARORA

Department of Pharmacology, All India Institute of Medical Sciences, New Delhi 16 and Indian Institute of Experimental Medicine, Jadavpur, Calcutta 32 (India), 13th January 1967.

[4] This work was supported by a grant from Indian Council of Medical Research.

[5] Present address: Indian Institute of Experimental Medicine, Jadavpur, Calcutta 32 (India).

The Effect of Urethane on Some Electrical Properties of Molluscan Giant Neurons

Giant neurons of the mollusc *Onchidium verruculatum* in the presence of 2% urethane become incapable of producing an all-or-none type of action potential. The analysis with voltage clamp technique indicates that in these conditions Na-conductance diminished while K-conductance stayed at the same level. Similar results were obtained in Na-free solutions[1]. Thus urethane seems to act selectively on Na-conductance, which is probably connected with a Na-carrying mechanism. This point of view is shared also by authors using smaller concentrations of urethane on nerve and muscle fibres of other animals[2,3].

The present paper deals with the influence of urethane on some electrical properties of giant neurons of 2 species of Gastropodes: *Helix pomatia* and *Planorbis corneus*. These 2 species show distinct difference in excitability when placed in Na-free solutions[4]. A preliminary note of the present work has been published elsewhere[5].

Methods. The giant neurons from the visceral and parietal ganglia of *Helix pomatia* and *Planorbis corneus* were investigated. The ganglia were separated from the body and placed in the chamber with perfusing system. A 2% solution of ethyl-urethane was used in normal physiological saline. The experimental set-up for intracellular recording and stimulation and the physiological solutions used in this work are given in the authors' previous papers[6,7]. 12 experiments on 7 specimens of *Helix pomatia*, and 17 experiments on 10 specimens of *Planorbis corneus* were carried out.

Results. On the giant neurons of *P. corneus*, urethane exerts a rapid effect manifested by reduction of the amplitude of the spontaneous spike, increase of its duration and slowing of its rise-time (Figure 1 B). The action potentials were abolished 4–5 min after the beginning of perfusion with solution containing urethane. Nerve cells investigated in Na-free solution became incapable of producing action potentials in the same time (Figure 1 C).

The voltage-current relationship of the membrane after urethane is non-linear. Depolarizing currents evoked a smaller drop of the voltage as compared with the hyperpolarizing currents (Figure 1 D). Examples of electrotonic responses after urethane as a result of passing depolarizing and hyperpolarizing currents of the same intensity and duration are seen in Figure 1 E. The

[1] S. HAGIWARA and N. SAITO, J. Physiol. *148*, 161 (1959).
[2] I. TASAKI and A. F. BAK, J. Neurophysiol. *21*, 124 (1958).
[3] F. THESLEFF, Acta physiol. scand. *37*, 335 (1956).
[4] V. D. GIERASIMOV, P. G. KOSTYUK and V. A. MAISKI, Bull. exp. Biol. Med. U.S.S.R. *58*, 3 (1964).
[5] V. D. GIERASIMOV and L. JANISZEWSKI, *Cetvertoje naucnoje sovescanije po evolucjonnoj fisiologij, posviascennoje pamiati akademika L. A.*, Orbeli, SSSR *77*, (1965).
[6] L. JANISZEWSKI, (N. Copernicus University Press, Torun, 1965).
[7] V. D. GIERASIMOV, Fiziol. Zh. SSSR *50*, 457 (1964).

magnitude of the electrotonic responses on hyperpolarizing pulses in normal conditions and after urethane were not significantly different.

All the above-mentioned changes after urethane were similar to those obtained in Na-free solution and were reversible.

In *H. pomatia* most giant neurons remained excitable after treatment with 2% ethyl-urethane for 1 h (Figure 2 B).

An increase of the threshold for the action potential and the membrane resistance was observed (Figure 2 D). Some of the cells generated after urethane spontaneous single bursts of spikes, which were followed by a prolonged hyperpolarization. The amplitude of the spikes did not decrease. In some cells a gradual increase of spike amplitude within the bursts was observed (Figure 2 B). All these findings with urethane were simulated in experiments with Na-free solution (Figure 2 C). A minority of giant cells from the investigated ganglia in *H. pomatia* stopped generating action potentials in Na-free solution. These cells also showed the absence of activity when urethane was added to normal physiological solution.

Another series of experiments was carried out with *Helix* neurons placing them in Na-free solution containing 2% urethane. In this state the neurons became incapable of producing spikes, but the response in hyperpolarizing direction was of the same magnitude as compared with the case when urethane was added to normal physiological solution. Figure 2 D shows the corresponding current voltage relationship. In these cases, which are represented in the Figure, the threshold for the action potential

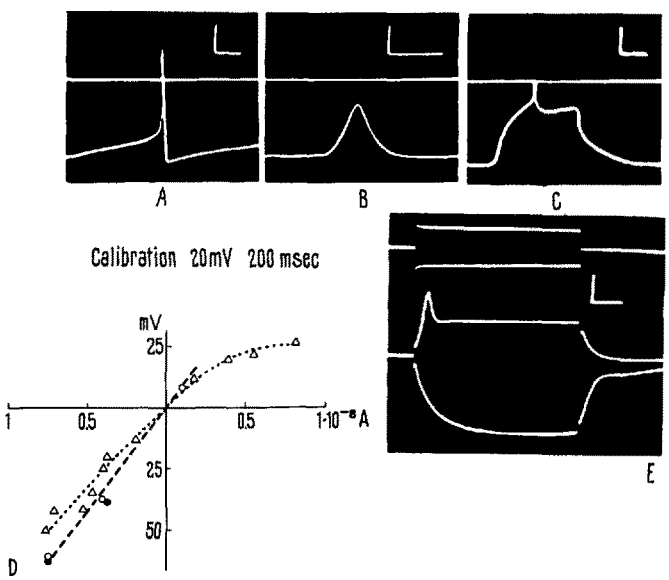


Fig. 1. The influence of urethane on the giant neurons of *Planorbis corneus*. (A) Spontaneous spike in normal solution, (B) spontaneous response in normal solution after adding or urethane, (C) response obtained on electrical stimulation in Na-free solution, (D) current-voltage relations in various conditions, (E) electrotonic responses obtained in normal solution after adding of urethane, calibration 20 mV, 100 msec ($I = 0.7 \cdot 10^{-8}$A). —●— normal, ···△··· urethane in normal solution, ---○--- recovery.

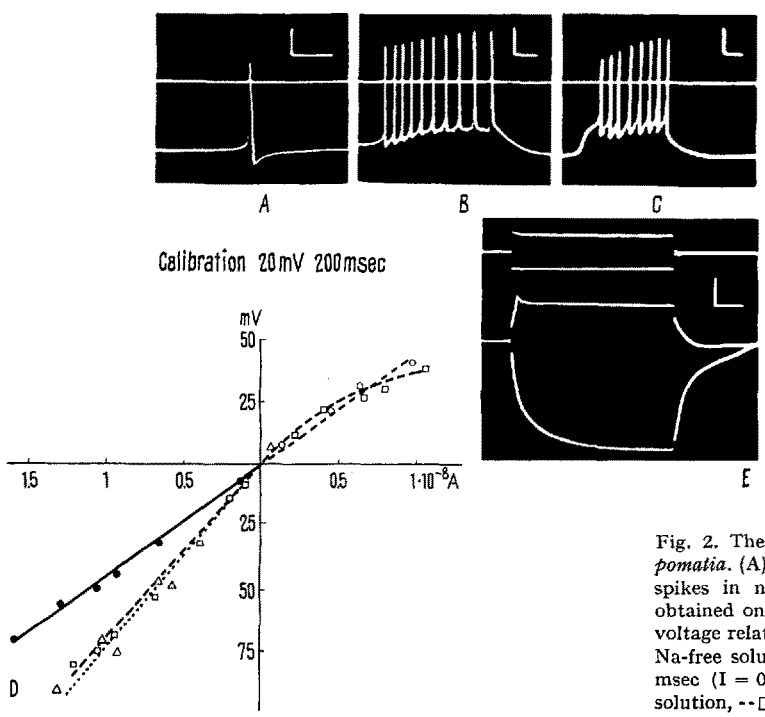


Fig. 2. The influence of urethane on the giant neurons of *Helix pomatia*. (A) Spontaneous spike in normal solution, (B) spontaneous spikes in normal solution after adding of urethane, (C) spikes obtained on electrical stimulation in Na-free solution, (D) current-voltage relations in various conditions, (E) electrotonic responses in Na-free solution after adding of urethane, calibration 20 mV, 100 msec ($I = 0.8 \cdot 10^{-8}$A). —●— normal, ···△··· urethane in normal solution, --□-- urethane in Na-free solution, ---○--- recovery.

in normal conditions was very low and it was impossible to determine the current-voltage relation in the depolarizing direction. When the preparation was washed with normal physiological solution after the treatment with urethane, the threshold increased. The depolarizing current-voltage relationship in these conditions had a linear course and was the continuation of the hyperpolarizing diagram obtained in normal conditions.

The results of the present work seem to confirm the point of view of other authors that urethane and other narcotics[8] act in some way on the Na-permeability. In *H. pomatia* the neurons which were capable of producing spikes in Na-free solutions, continued to produce them after urethane. Na-free solutions and urethane applied simultaneously abolished the spikes.

It is also interesting that the neurons of *Helix* are not uniform in reacting to Na-free medium or urethane. This fact seems to indicate that there exists within the neurons a distinct specificity in sensibility towards some drugs. This has been pointed out by other authors[9].

Résumé. Chez le mollusque *Helix pomatia*, les neurones géants sont capables de produire des potentiels d'action dans des solutions dépourvues de Na^+. L'uréthane n'inhibe pas la production des potentiels d'action. Chez *Planorbis corneus* la solution dépourvue de Na^+, aussi bien que l'uréthane, entraînent l'inhibition des potentiels d'action. Ces données permettent d'affirmer que l'uréthane influence sélectivément la perméabilité de la membrane pour Na^+.

V. Gierasimov[10] and L. Janiszewski

Chair of Neurophysiology and Comparative Physiology, Department of Comparative Physiology, N. Copernicus University, Torun (Poland), 2nd January 1967.

[8] R. E. Taylor, Am. J. Physiol. *196*, 1071 (1959).
[9] L. Kerkut and M. Walker, Comp. Biochem. Physiol. *7*, 277 (1962).
[10] Present address: Physiological Institute, Kiev 24 (USSR).

Water Intake in Relation to Blood Potassium Types in Desert Sheep

In the arid habitat of the Marwari breed of sheep in Western Rajasthan in India, economic utilization of the available water resources is of utmost practical importance. The present comparative study on the water requirements of animals of this breed, belonging to the 2 blood potassium types, high potassium (HK) and low potassium (LK), was aimed at finding out the relative superiority, if any, of 1 type of animal over the other for survival under arid conditions so far as the requirement of drinking water is required.

It has been reported by Evans[1] that, on the average, LK type sheep drank less water than HK type animals. The data used in his report, however, came from various metabolic trials carried over a year, and although equal numbers of LK and HK animals were used in each trial, the body weights of the animals used in these trials were not published. Evans has conjectured that, apart from the blood potassium type, other factors may also effect the water metabolism in sheep. In the experiment under report, the water intake of sheep belonging to the 2 potassium types was studied by using pairs of different potassium type animals of same age and equal body weight so that valid comparisons could be made between the 2 potassium types for water consumption.

After determining the blood potassium concentration[2] of the individual animals in the flock, 6 pairs each consisting of 1 high and 1 low potassium type animal were selected on the basis of equal body weights. The flock comprised wethers of 3 years of age. The body weights and potassium concentrations along with the water intake, averaged over 5 consecutive days, during the summer (mean maximum temperature 35.5 °C mean minimum temperature 21.9 °C, relative humidity 75%), for each sheep of the 2 potassium types are given in the Table. The results indicate that 5 LK animals out of 6 drank less than their HK counterparts. On the average LK (potassium concentration 6.007 ± 0.817 mEq/l) sheep drank 2.983 ± 0.216 l/day whereas the consumption in HK (potassium concentration 23.680 ± 1.644 mEq/l) sheep was 3.667 ± 0.289 l/day. The difference between

Blood potassium concentration, body weight and water intake of high (HK) and low (LK) potassium type of Marwari sheep

Animal no.	Whole blood potassium concentration (mEq/l)	Body weight (kg)	Water intake (l)
LK			
7	8.96	45.3	3.5
14	4.48	41.5	3.4
22	6.40	41.5	3.4
9	8.96	40.5	2.8
19	5.12	39.5	2.6
12	5.12	33.0	2.2
Mean ± S.E.	6.007 ± 0.817	40.217 ± 4.044	2.983 ± 0.216
HK			
134	25.60	46.0	4.1
26	17.92	41.5	4.1
2	24.96	41.5	3.0
137	19.84	40.0	3.8
146	24.96	39.5	4.4
4	28.80	33.0	2.6
Mean ± S.E.	23.680 ± 1.644	40.250 ± 4.228	3.667 ± 0.289

[1] J. V. Evans, Nature, *180*, 756 (1957).
[2] G. C. Taneja and R. K. Abichandani, Experientia *23*, 273 (1967).