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ABSTRACTS

CHOLINERGIC INHIBITORY MECHANISMS IN THE CEREBRAL CORTEX. **V. K. Bhargava and B. S. Meldrum.** *Department of Pharmacology, Maulana Azad Medical College and Associated Irwin & G. B. Pant Hospitals, New Delhi.*

Application of strychnine or d-tubocurarine to the exposed cerebral cortex leads, after a few min, to a change in the somato-sensory evoked potentials. This consists of surface negative wave (peak latency 21-23 msec.) which attains an amplitude of 5-20 times greater than that of the normal evoked potentials, and probably reflects excessive depolarization of the apical dendrites of the pyramidal neurone. The excitant effect of strychnine or curare was not blocked by GABA, glycine or nor-adrenaline. Prior eserization of the cortex, however, completely blocked the effect of strychnine. One possible interpretation of this antagonistic effect of physostigmine is that strychnine and curare block a cholinergic inhibitory system in the cortex.

Key words : evoked potentials cholinergic inhibition

ACETYLCHOLINE-LIKE ACTIVITY IN THE HUMAN CSF IN HEALTH AND SOME NEUROLOGICAL DISORDERS. **K. R. Kothandaraman and S. K. Lal.** *Department of Physiology, JIPMER, Pondicherry-6.*

Acetylcholine (Ach)-like activity was estimated in the C.S.F. of patients of neurological disorders with special reference to seizure cases. Non-neurological patients served as controls. The estimations were done by recording the depressor response of anaesthetised, eviscerated field rats.

The C.S.F. (Ach)-like activity was demonstrated in every sample. The mean C.S.F. Ach level in the control group was $2.71 \text{ g}\% \pm 0.15$. In epilepsy it was markedly elevated as also after electroconvulsive therapy. There was a moderate, statistically significant elevation of CSF Ach-like activity in Parkinsonism, migraine, peripheral neuritis and hemiplegia, but the number of patients in these groups was small. The lowest level was found in schizophrenics of withdrawn-type psychiatric cases exhibiting inactivity.

Key words : C.S.F. acetylcholine-like activity

CONDUCTION VELOCITY IN THE FASTEST MOTOR FIBRES OF NERVE ULNARIS. **S. K. Lal, V. Anantharaman and Chidambaram Ramakrishnan** WITH TECHNICAL ASSISTANCE BY **Balachandran**.
Department of Physiology, JIPMER, Pondicherry-6.

Conduction velocity was measured in the ulner nerve (elbow to wrist) of 16 apparently healthy persons. The muscle response was picked up from the hypothenar muscle. A decrease in the conduction velocity was noted with age, which was significant after the age of 40 years.

Key words : ulnar nerve conduction velocity

BEHAVIOURAL RESPONSES ON STIMULATION OF RETICULAR FORMATION OF THE BRAIN STEM. **K. Chakrabarty, U. Nayar and B. K. Anand**. *Department of Physiology, All India Institute of Medical Sciences, New Delhi-16.*

The effects of stimulation of the reticular formation of the brain stem on behaviour were studied in 15 cats. Bipolar electrodes were implanted and stimulation was carried out daily for one hr after post-operation recovery.

Stimulation of various points in the mesencephalic reticular formation caused severe rage reaction and random circling movements. Stimulation of the area just around nucleus reticularis pontis caudalis produced jerky movements of the ears and facial muscles of both sides and there was forced circling (Manege). Stimulation of nucleus reticularis pontis oralis lateral to the substantia grisea centralis caused severe rage reaction, nystagmus of left eye, contraction of left palpebral muscles and exploratory behaviour. Stimulation of reticular formation of medullary region near the midline caused urination. On stimulation of nucleus reticularis pontis there was marked salivation, dilatation of pupils and contraction of trunk muscles. Most of these points of stimulation were restricted to the midline.

In general, there was a defence-attack reaction. Jerky movements of the ears, facial muscles, contraction of trunk muscles, and forced circling were observed. All these seem to be parts of an activation or arousal response.

Key words : brainstem reticular formation behavioral responses

EFFECT OF FENFLURAMINE ON THE SINGLE NEURONE ACTIVITY OF HYPOTHALAMIC FEEDING CENTRES. **S. K. Khanna, U. Nayar and B. K. Anand**. *Department of Physiology, All India Institute of Medical Sciences, New Delhi-16.*

Electrical activity of single neurones of hypothalamic satiety and feeding centres and other adjacent areas was recorded with the help of stereotaxically guided steel micro-electrodes, before

and after fenfluramine infusion in doses of 1.5 mg/kg. In addition arterial and venous blood glucose estimations were carried out to assess the levels of glucose utilisation. The spike frequency of satiety centre units increased, while that of feeding centre units decreased in response to fenfluramine while other hypothalamic units did not show any change. The A-V glucose difference also increased, indicating increased level of glucose utilization.

Key words :

fenfluramine

hypothalamic neurones

ROLE OF HYPOTHALAMUS IN THE REGULATION OF CERTAIN VISCERAL RESPONSES INITIATED BY HYPERTHERMIA. **Usha Sachdeva, G. S. Chhina and B. Singh.** *Department of Physiology, All India Institute of Medical Sciences, New Delhi-16.*

Hypothalamus produces changes in visceral responses related to the temperature regulation and homeostatic requirements of the body. It has not yet been shown as to how these visceral responses from hypothalamic areas would be modified at different body temperatures.

Stimulation of eleven areas of hypothalamus was done in 23 dogs under chloralose anaesthesia, at their initial body temperature and changes in blood pressure, respiratory rate and heart rate were observed. The body temperature was then increased gradually by surface heating and stimulation was repeated at each one degree rise of temperature.

Stimulation of anteromedial regions of hypothalamus especially preoptic, in normothermic dogs produced cardiovascular respiratory responses similar to those of hyperthermia. The majority of the pontis of posterolateral and middle medial area however produced responses which were unlike hyperthermic changes. As body temperature was increased gradually, stimulation of anteromedial hypothalamic areas ceased to produce any effect as soon as spontaneous panting started. Changes obtained in visceral responses from stimulation of posterolateral regions, on the other hand, were not affected even at a temperature of 42°C. On cooling the hyperthermic animal the visceral responses on stimulation of anteromedial areas could re-elicited after body temperature had just fallen by 0.5°C.

It appears that at higher body temperature the anteromedial regions stop exercising their influences on the visceral responses initiated by hyperthermia; instead peripheral thermal receptors and medullo-spinal reflexes play a more important role. Posterior, hypothalamus seems to be related to regulation of visceral responses meant for other homeostatic activities in the body.

Key words :

hypothalamic stimulation

hyperthermia

SUBCORTICO-CORTICAL INTERACTIONS DURING THE DIFFERENT STATES OF CONSCIOUSNESS IN ADULT MONKEYS. **G. S. Chhina, S. Kesar, Baldev Singh and B. K. Anand.** *Department of Physiology, All India Institute of Medical Sciences, New Delhi-16.*

The subcortical inputs to the cortical areas react differently during different states of consciousness. In the present study the effects of stimulation of structures in basal ganglia and thalamus on the cortical EEG and evoked responses were investigated during awake period and slow sleep.

A total of two sessions involving the stimulation of intralaminar thalamic nuclei were conducted during awake and slow sleep and the evoked responses and EEG from ipsilateral superior frontal cortex to single shocks were recorded. Similarly the effects of stimulation of caudate were seen on evoked responses from pericentral cortex in three and post-central cortex in two sessions. Each session involved the recording at least in awake and delta phase of slow sleep. During the awake phase, two low voltage deflections were obtained between 5 to 20 μV from the post central cortex. The first deflection was of comparatively shorter duration and lower amplitude. During sleep there was considerable increase in voltage observed in both the deflections. The second deflection, however, had higher amplitude when accompanied by high amplitude slow EEG waves, whereas the first response had higher amplitude if accompanied by spindle type of EEG. The duration of second response also showed some decrease whenever there was increase in its amplitude under the above mentioned condition.

The responses of pre-central cortex were also of similar type with the exception that first response showed a greater increase in amplitude as compared to second, even during the slow sleep.

Stimulation of intralaminar thalamic nuclei during awake phase produced a higher amplitude evoked response which in EEG was accompanied by a spindle like trail following the stimulus artefact. During slow sleep the amplitude of slow response showed a decrease but in addition each single shock was followed after a short latency by high voltage slow wave in the EEG.

Thus evoked responses in the same phase of sleep reacted differently from different cortical areas even when evoked by the same input. The intralaminar input which normally produces arousal type of EEG activity, in the present investigation produced a lower amplitude evoked response during slow sleep, whereas the caudate had a opposite effect which fits in with its inhibitory type of influence on cortical activity.

Key words : sleep consciousness subcortico-cortical interactions

STUDY OF EVOKED POTENTIALS FROM THE DIFFERENT BRAIN REGIONS ON STIMULATION OF SPERMATIC NERVE. **H. K. Kang, G. S. Chhina, Baldev Singh and B. K. Anand.** *Department of Physiology, All India Institute of Medical Sciences New Delhi-16.*

It is not yet clear as to how the nervous afferents in the genital organs modify the regulation of gonadal function and what role the hormones play in these feed-back processes. In the present study evoked responses were recorded from different areas of brain in 35 adult male monkeys on stimulation of spermatic nerve.

Evoked responses of purely negative sign were recorded from the tuber cinereum and middle part of ventromedial nucleus of hypothalamus. The anteromedial areas of the hypothalamus showed evoked responses with the initial negative deflection and posterolateral areas had an initial positive phase. The monophasic positive or predominantly positive responses were obtained from the posterior hypothalamus and mammillary body. From amongst extra hypothalamic areas only anterior perforate substance showed monophasic negative responses. The responses from hippocampal region and cingulate gyrus showed an initial negative phase. The amygdalar responses and those from temporal tip were inconsistent. The responses of the perineal sensory motor region were of shortest latency and were similar to those of the other primary sensory cortical evoked responses. The projection to the hypothalamus seems to occur via the periventricular fibre system as assessed by the latency of the evoked responses.

These observations show the projection of sensory afferents to those areas of the brain which earlier have been shown to be related to the regulation of sex functions.

Key words : spermatic nerve evoked potentials limbic system

ROLE OF CENTRAL CATECHOLAMINES IN MEDIATION OF CODEINE ANALGESIA IN ALBINO RATS. **S. S. Ahmed and G. J. S. Abraham.** *Department of Pharmacology, Goa Medical College, Panaji, Goa.*

Recent reports on the possible mediation of central neurohumors in the opiate analgesia have been conflicting. However, majority of papers indicate the mediation of central nor-adrenaline in the analgesic effect of morphine. In this study, the analgesic effect of two doses of codeine (30 mg/kg and 60 mg/kg) was studied in albino rats using Haffner's method (mechanical experimental pain). Acute reserpization (0.5 mg/kg sc one hr prior) antagonized the analgesic effect of codeine while chronic reserpization (2 mg/kg 1st day, 0.5 mg/kg 2nd day and 0.1 mg/kg 3rd day) caused significant potentiation of codeine analgesia. L-DOPA (50 mg/kg ip ½ hr prior to codeine) antagonised the potentiating effect to chronic reserpization.

Alpha-methyl-m-tyrosine given intravenously in a dose of 25 mg/kg, 13 hr prior to the experiment, potentiated codeine analgesia. This potentiation was annulled by pre-treatment with DOPA. Alpha adrenergic blocking drugs (phentolamine and phenoxybenzamine) and

beta-adrenergic blocking drugs (D.C.I. and propranolol) produced equivocal effects at 4 doses. The levels of codeine analgesia (30 mg/kg, 45 mg/kg, 60 mg/kg and 75 mg/kg). These results indicate an antagonistic action of noradrenaline to the analgesic effect of codeine in albino rats.

Key words : central catecholamines codeine analgesia

CENTRAL EFFECT OF LIGNOCAINE IN ORGANIC PHOSPHATE INTOXICATION. M. A. Matin and P. P. Kar. *Industrial Toxicology Research Centre, Chattar Manzil Palace, Lucknow.*

Lignocaine on intravenous administration has been reported to control tremors and convulsions in organophosphate intoxication. The organophosphate compounds cause accumulation of acetylcholine in the CNS and other parts of the body which is directly related to tremors, convulsions and other toxic effects commonly observed after the administration of these compounds. Effects of lignocaine on increase in brain acetylcholine after the administration of organophosphates was therefore examined. It was observed that lignocaine did not modify the organophosphate-induced increase in the brain acetylcholine of rats.

Key words : lignocaine brain Ach organophosphates

EFFECTS OF CAFFEINE, AMPHETAMINE, IMPRAMINE AND NIALAMIDE ON BEHAVIOUR, RESPIRATION, PUPIL SIZE AND TEMPERATURE IN RABBITS. R. N. Borah and A. Ahmed. *Department of Pharmacology, Assam Medical College, Dibrugarh.*

Two psychomotor stimulants e.g. caffeine and amphetamine were compared with two antidepressants e.g. imipramine and nialamide by studying their effects on behaviour, respiration, pupil size and temperature in rabbits. The antidepressants caused no increase in motor activity, but imipramine caused ataxia. Of the psychomotor stimulants caffeine showed greater respiratory stimulant activity than amphetamine both in normal and morphine treated animals. Imipramine also showed the capacity to increase the respiratory rate in normal and morphine treated animals. Nialamide had no effect on respiratory rate. Of the four drugs only amphetamine was found to increase the size of the pupil. Both the psychomotor stimulants raised the temperature by more than 1°C. The rise of temperature was greater in the amphetamine treated animals than in the caffeine treated animals. The two antidepressants caused no appreciable rise or fall of temperature in rabbits.

Key words : rabbit behaviour psychomotor stimulants antidepressants

IN VITRO EFFECTS OF INSULIN ON THE GLUCOSE UPTAKE, GLYCOGEN SYNTHESIS AND LACTATE PRODUCTION IN RAT CEREBRAL CORTEX SLICES. **K. G. Prasannan.** *Department of Biochemistry, JIPMER, Pondicherry-6.*

The effect of insulin on the glucose uptake, glycogen synthesis and lactate production by cerebral cortex slices of normal fed rats was studied *in vitro* under aerobic and anaerobic conditions.

It was observed that insulin added to the incubation medium exhibited a marked effect in enhancing the oxygen consumption, glucose uptake, and glycogen synthesis by cerebral cortex slices in an oxygen atmosphere. Under anaerobic conditions, addition of insulin to the medium enhanced both CO₂ production and glucose uptake by cerebral cortex slices, without causing any effect on glycogen synthesis. Lactate production by slices though seemed unaffected by insulin under aerobic conditions, was found to be enhanced markedly by this hormone when incubated in an atmosphere of nitrogen.

Key words : cerebral cortex glucose uptake insulin brain metabolism

ANTICONVULSANT ACTIVITY OF A SUBSTANCE ISOLATED FROM *ACORUS CALAMUS*, LINN. **Y. S. Naik.** *Department of Pharmacology, Medical College, Aurangabad.*

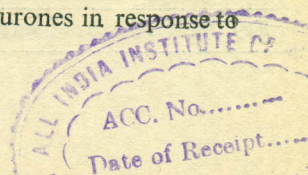
Acorus calamus rhizomes were subjected to chloroforms pyridine extraction and through several other steps a crystalline substance was obtained. This substance gave a test for a secondary amino-compound and the melting point of this basic substance was 147°C. Hydrochloride of this substance was made to facilitate preparation of an aqueous solution.

The anticonvulsant activity was tested against Metrazol induced convulsions in mice. Four doses of the test substance, namely 15 mg, 20 mg, and 30 mg per 100 g were tried. The lowest gave about 30 per cent protection while the highest gave 100 per cent protection.

Key words : *acorus calamus linn* anticonvulsant activity

EFFECT OF GLUCOSE ON THE MULTIUNIT ACTIVITY OF 'SATIETY' NEURONES IN THE HYPOTHALAMUS AFTER PARASAGITTAL KNIFE CUTS BETWEEN LATERAL AND MEDIAL AREAS. **S. P. Bhattacharya, U. Nayar and B. K. Amand.** *Department of Physiology, All India Institute of Medical Sciences, New Delhi-16.*

It is well established that increased A-V glucose increases the unit activity of the 'satiety' neurones in the hypothalamus. The discharge pattern of the 'satiety' neurones in response to



glucose after isolating them from the feeding centre neurones has not been investigated. In this study the effects of intra-carotid glucose infusion on the activity of satiety neurones before and after placing the parasagittal knife-cuts between the satiety and feeding areas were described.

Albino rats were anaesthetised with intraperitoneal allobarbitone and urethane. Micro-macroelectrodes (tip diameter 25-30 μ) were stereotaxically placed in the ventromedial nucleus (VMN) of the hypothalamus and multi unit activity (MUA) was recorded. Glucose (0.5 ml of 5% solution) was injected through carotid artery and its effect on MUA of VMN was observed. A parasagittal knife cut was given by a specially designed microknife stereotaxically in between VMN and lateral hypothalamus and MUA was again recorded before and after intra-carotid glucose injection.

Multiunit activity of ventromedial neurones increased markedly in amplitude and frequency on intracarotid glucose infusion both in intact and isolated ventromedial nucleus. The effect lasted for more than sixty min. These findings indicate that 'satiety' centre neurones are probably specifically glucosensitive.

Key words : hypothalamic centres unit activity

NEURAL CONTROL OF SOME FUNCTIONAL ASPECTS OF SMALL INTESTINE RELATED TO ENERGY BALANCE,
S. Thomas, R. Puri, G. S. Chhina, Baldev Singh and B. K. Anand. *Department of Physiology, All India Institute of Medical Sciences, New Delhi-16.*

The realisation about the role of small intestine in the regulation of food intake and the neuro-humoral mechanisms for energy balance has emerged from recent experimental evidences. In the present investigations, a loop of small intestine was isolated and its role in the food intake and the related changes in absorption and motility were investigated.

Presence of glucose in isolated loop of intestine in chronic animals depressed the food intake whereas glycine either produced an increase or no change in food intake. The introduction of iso-osmotic solutions of sucrose and saline further showed that absorption of glucose is not related to the changes in food intake. These observations suggest the possibility of a neural reflex mechanism which is activated or inhibited by the presence or absence of glucose in the lumen of the gut. The changes in the motility and tone during the presence or absence of glucose in the lumen indicated no specific correlation. The neuro-humoral mechanisms which may be related to the motor component of this reflex have the possible involvement of sympathetic and vagal nerve supply.

Key words : energy regulations food intake intestinal perfusion

PERIPHERAL PATHWAY OF RESPIRATORY EXCITATION OBTAINED ON STIMULATION OF SCIATIC NERVE. **Khetarpal, B. K. Anand and S. K. Manchanda.** *Department of Physiology, All India Institute of Medical Sciences, New Delhi-16.*

In chloralose anaesthetized cats respiratory response to the stimulation of the cut central end of the sciatic nerve was studied. The stimulus was graded in multiples of the threshold strength required to elicit a twitch at the lateral head of the gastrocnemius muscle when stimulated through its motor nerve. The results indicate that the respiratory response to the stimulation of somatic afferents increases proportionately with the increasing strengths of stimulus upto thirty times the threshold and then it becomes a plateau. After bilateral cervical sympathectomy the threshold stimulus required to bring about the response is increased, the magnitude of response obtained by suprathreshold stimuli is significantly reduced at all levels, and if stimulation is continued beyond one min the differences become less marked.

This study confirms the conclusions reported earlier that sympathetic nerve supply to carotid body participates in the neural regulation of respiration. As the difference in the respiratory responses is more marked in the first min of stimulation, this points to the participation of this mechanism in the initial brisk responses to excitation of sciatic nerve.

Key words : somato-sensory respiratory excitation . cervical sympathetics

CORRELATION OF CHANGES IN CARDIO-RESPIRATORY RESPONSES AND MONOSYNAPTIC REFLEX RESPONSE DURING HYPOTHERMIA. **Neena Bhattacharya, G. S. Chhina and Baldev Singh.** *Department of Physiology, All India Institute of Medical Sciences, New Delhi-16.*

In our experiments reported earlier inhibition of monosynaptic reflex response in the dog was observed at a body temperature range of 39-29°C during the induction of hypothermia, while a marked facilitation occurred during rewarming. We report now the experiments in cats anaesthetized with chloralose (80 mg/kg). Monosynaptic reflex response was recorded from the nerve to gastrocnemius muscle on stimulation of the sciatic nerve (1 to 5 V, 0.04 msec, pulse at 6/min). The body temperature was then lowered by surface cooling and brought down to 27°C, the response being recorded for every one degree fall in body temperature. The observations were repeated during rewarming. The response showed a slight increase in threshold but marked potentiation during cooling upto 27°C as well as during rewarming upto 34°C; raising the temperature beyond this reduced the amplitude without changing the threshold.

During hypothermia though, there was a gradual fall in blood pressure, heart rate and respiration. These changes had no correlation with the changes in response characteristics. Stimulation of Ia fibres for eliciting the monosynaptic reflex response produced a significant increase in blood pressure between 32 to 27°C even at a slow rate (6/min) of stimulation. The blood pressure was not affected appreciably at temperatures below 27°C and between 37 and 40°C.

There were no concomitant changes in the heart rate and respiration. It is likely that the observed facilitation in monosynaptic reflex response may be due to improved perfusion because of increase in blood pressure between 32 to 27°C. This study also demonstrates a species difference between the behaviour of monosynaptic reflex response in cats and dogs. In the cat for example there was no depression of the monosynaptic response between 30-29°C.

Key words : monosynaptic reflex hypothermia

STUDY OF CENTRAL PROJECTIONS OF MESENTERIC AFFERENTS. V.M. Kumar, G. S. Chhina and B. L. Anand. *Department of Physiology, All India Institute of Medical Sciences, New Delhi-16.*

The central projections of the mesenteric nerves have not yet been worked out. In the present study mesenteric nerves were separated from the superior mesenteric artery, sectioned peripherally, and evoked responses from the brain regions recorded on stimulation of their central ends. A total of 430 points were explored. 332 out of these were located in hypothalamus, 14 in midline thalamic nuclei, 59 in brainstem and 25 in cortex. The anteromedial regions of hypothalamus generally showed responses which had an initial negative phase, but those from postero-lateral areas started with an initial positive phase. In addition, a reciprocal relationship between the negative and positive phases of the responses from satiety and feeding areas were also observed. The latencies of the responses from the middle medial area were the smallest as compared to anterior and posterior portions of hypothalamus indicating the input to be occurring through periventricular region.

Responses were also evoked in the midbrain which were shown to be related to food intake by Subberwal and Anand (1965), and in the cingulate, marginal and anterior sigmoid gyri in addition to those from midline thalamic nuclei. Thalamic and cortical responses were of shorter latency as compared to those from hypothalamus. These observations are suggestive of nervous afferent feed-back to hypothalamus and cortical regions for the regulation of food intake.

Key words : mesenteric nerves central projections

DISINHIBITION OF EXTENSOR MOTONEURONES AFTER INTERCOLLICULAR DECEREBRATION. L. Kuckuck, J. Haase and J. Noth. *Department of Physiology, All India Institute of Medical Sciences, New Delhi-16.*

The current concept of the mechanism of decerebrate rigidity is that central disinhibition of gamma-motoneurons brings predominantly extensor alpha-motoneurons in a state of post-tetanic potentiation. Experiments at MPIEM Goettingen West Germany do not support this view.

From frequency-stretch correlations it was concluded that the proprioceptive gross impulse inflow on alpha-motoneurons does not increase after intercollicular decerebration. With continued anaesthesia and interrupted alpha-loop the following indications of alpha-motoneuron disinhibition were found after decerebration: more regular responses, shortening of reflex time, increase of discharge frequency, enhancement of post-tetanic potentiation, recruitment, and decreased antidromic inhibitability.

These findings lead us to the conclusion that decerebrate rigidity is not merely and possibly not even mainly based on increased fusimotor activity but is brought about to a great extent by disinhibition of extensor alpha-motoneurons.

Key words : decerebrate rigidity alpha motoneurones

STUDY OF THE DISTRIBUTION OF THE ADRENERGIC FEEDING MECHANISMS IN THE HYPOTHALAMUS.
N. Surie, U. Nayar and B. K. Anand. *Department of Physiology, All India Institute of Medical Sciences, New Delhi-16.*

Neuropharmacological investigations have identified a number of potential synaptic transmitter substances that are distributed in the central nervous system. Adrenergic drugs have been shown to affect the 'feeding' mechanisms while cholinergic drugs, the 'drinking' mechanism. However, the detailed mapping of these adrenergic feeding mechanisms in the hypothalamus has not been done. In this study we report the distribution of adrenergic feeding mechanisms in the hypothalamus by local application of adrenaline.

Cannulae were implanted in rats in different regions of the hypothalamus. Chemical stimulation was done by dislodging the adrenaline crystal present in the cannula. Twenty-five rats were studied. Observations were made after the rats were stabilized on the synthetic diet. Stimulation of the 'feeding' centre in 4 rats resulted in a marked increase in the 1 hr and 24 hr food intake, and body weight. Chemical stimulation of the 'satiety' area in 3 rats showed a marked decrease in the food intake and weight. There was a decrease in the food intake and weight on stimulation of the midlateral hypothalamus, i. e. the area between the feeding and satiety centres in ten rats. On stimulation of other regions, the posterior hypothalamus, the mammillothalamic tract, the lateral habenular nucleus, anteromedial thalamic nucleus, III ventricle and paraventricular nucleus, there was no change in food intake or weight. These findings indicate that adrenergic mechanisms may have an important role in feeding behaviour.

Key words : hypothalamic centres feeding mechanisms adrenergic excitation

INFLUENCE OF SEX HORMONES ON PENTOBARBITONE SLEEPING TIME. **N. M. Tiwari, K. J. Namdeo, S. D. Gadgil, L. P. Kanitkar and V. N. Vate.** *Department of Pharmacology, Miraj Medical College, Miraj (Dist. Sangli) Maharashtra.*

Effect of orchidectomy and ovariectomy on pentobarbitone sleeping time in male and female rats was studied. The sleeping time was increased in both male and female rats after operation. Male sex hormone decreased pentobarbitone sleeping time in ovariectomised rats and female sex hormone increased pentobarbitone sleeping time in orchidectomised male rats. The results show dependence of central nervous system reactivity on sex hormones.

Key words : pentobarbitone sleeping time orchidectomy ovariectomy

ELECTROGENESIS IN GUSTATORY RECEPTOR CELLS OF FROG. **K. N. Sharma, S. Dua-Sharma and V. Gopal.** *Department of Physiology, St. John's Medical College, Bangalore.*

With the aid of micromanipulator under stereomicroscope, 0.2-0.5 μ tip diameter glass pipette filled with 3 M KCl, is guided under visual direction to impale cells in gustatory papillae. The micropipette serves for recording, as well as, with the help of a bridge circuit, for direct stimulation of the impaled cell. A second micropipette is used for local perfusion. As the cell is impaled there is a negative deflection of 20 to 30 mv in membrane potential which can be maintained for long duration. Local surface perfusion with NaCl solution tends to depolarise the membrane potential, the magnitude of depolarisation increasing with an increasing concentration of NaCl. The reversal potential of the receptor potential produced by NaCl varied between 0 to + 25 mv in 13 cells tested so far. In the same receptor zone, another cell was identified which did not show any appreciable change in membrane potential on surface application of NaCl (18 cells).

Electrical stimulation has also resulted in identification of two types of cells in the same neighbouring zone. One cell shows further increase in negativity on cathodal stimulation proportional to stimulus intensity which varied between 1×10^{-9} to 2×10^{-9} amps. Passing depolarising current shows reversible potential level close to + 10 mv (6 cells). The other cell does not show reversible potential change on such stimulation.

Key words : gustatory receptors electrogenesis

TRANSISTORISED LESION MAKER. **M. J. Kumar Doss, K. N. Sharma and S. Dua-Sharma.** *Department of Physiology, St. John's Medical College, Bangalore.*

Electrolytic lesion-maker is a useful tool for precise localisation, and assessment of functions in circumscribed zones of brain. Somehow, a suitable device is not available indi-

generously. A mains-operated solid-state lesion maker was therefore developed in the lab. The range of the equipment varies from 0.5 μA to 7.0 mA, with 5.0 μA 5.0 mA output, in calibrated positions. Continuously variable current, in three step-ranges of 5 μA to 50 μA , 50 μA to 500 μA and 50 μA to 5 mA, are available. Provision of three scales-wide-panel meter allows easy direct reading and display of currents. The continuous current output is available, for a wide resistance range of 0.1 Ohm to 3.5 Meg ohm, with an accuracy of 0.01% in micro-amp range and 0.5 to 1.0% in mA ranges. It can thus be used for various macro and micro electrode preparations. The output has polarity control for anodal or cathodal currents. It is a light weight compact unit for easy handling. The device has been successfully used for making stereotaxic brain lesions in rats, and the results compare extremely favourably with high cost imported lesion makers.

Key words : transistorised lesion maker

EFFECT OF COPPER IN BASAL GANGLIA ON LOCOMOTOR ACTIVITY IN RATS. **P. Simhadri and K. Krishnaveni.** *Upgraded department of Physiology, Institute of Medical Sciences, Hyderabad-1.*

Copper-dowex complex was deposited through a chronically implanted cannula in rats and its effect was noted on the locomotor activity (LMA) recorded for one hr by a method developed in this department. Compared with the control LMA (mean 4.4 ± 1.15 SEM) copper in globus pallidus significantly reduced the LMA to 24.8 ± 2.56 ($P < 0.001$) whereas copper in caudate nucleus increased the LMA to 135.2 ± 4.70 ($P = 0.001$). The dispersion of movements during one hr recording showed a variation between the effects of copper in globus pallidus and caudate nucleus and the control. While there was no significant dispersion of movements in LMA by copper in caudate nucleus, copper in globus pallidus revealed a significant variation ($P < 0.001$) despite low LMA.

Key words : basal ganglia locomotor activity role of copper

EFFECT OF NEUROTRANSMITTERS ON THE REFLEX RESPONSES IN FROG. **P. Simhadri and V. Parvathi.** *Upgraded Department of Physiology, Institute of Medical Sciences, Hyderabad-1.*

The motor reflex responses in frogs were elicited by ipsilateral and contralateral skin (leg) stimulation while the spinal cord was perfused according to the method of Angelucci. The responses and changes were recorded on a kymograph during perfusion of the spinal cord with Ringer, acetylcholine, nor-adrenaline and glutamic acid. Compared with the responses of the control (Ringer), perfusion with acetylcholine, nor-adrenaline and glutamic acid produced the following effects.

1. The responses to ipsilateral stimulation were increased when perfused with glutamic acid by 38-42%, with acetylcholine by 26-30% and with nor-adrenaline by 18-22%.

2. The supra segmental enhancing effect of ipsilateral reflex responses were further augmented on perfusion with neurotransmitters in the following order: glutamic acid, acetylcholine, nor-adrenaline, Ringer.

3. The coefficient of change in reflex responses was studied and it was found that produced with glutamic acid, nor-adrenaline and acetylcholine a change of 61.66%, 63.27% and 41.37% respectively.

Key words : neurotransmitter perfusion spinal cord reflexes

D-TUBOCURARINE INDUCED CONVULSIONS BY INTRACEREBRAL INJECTION IN RATS AND ITS INTERACTION WITH GABA. **V. R. Dhumal and C. P. Trivedi.** *Department of Pharmacology, G. R. Medical College, Gwalior.*

d-tubocurarine has been reported to induce convulsions when administered intraventricularly in cats. In the present study, the effect of d-tubocurarine injected intracerebrally was studied. The effects of d-tubocurarine (25 mcg) intracerebrally started appearing within 2 minutes and lasted for one hour, terminating in death of all animals. The simultaneous administration of 5-20 mg/kg GABA resulted in complete antagonism of all the effects of d-tubocurarine.

Key words : convulsions d-tubocurarine GABA

THE INTERACTION OF D-TUBOCURARINE AND GABA IN PENTOBARBITAL ANAESTHETISED AND DECEREBRATE DOGS. **V. R. Dhumal and C. P. Trivedi.** *Department of Pharmacology, G. R. Medical College, Gwalior.*

The interactions of d-tubocurarine and GABA were studied in pentobarbital anaesthetised and decerebrate dogs by applying them topically on spinal cord at C₁ and C₂ level. In the pentobarbital anaesthetised dogs d-tubocurarine in concentration of 0.1 percent failed to cause facilitation of scratch reflex by rubbing the pinna and also failed to induce spontaneous scratching movements of the hind limbs. However, in decerebrate preparation when d-tubocurarine was applied in concentration of 0.05 percent at C₁ and C₂, it caused facilitation of scratch reflex after 10 minutes. Later on spontaneous and powerful scratching movements of the hind limbs developed. These movements persisted for about half an hour even after the stoppage of the application d-tubocurarine and washing the parts with artificial C. S. F. Re-application of d-tubocurarine, produced same effects. Subsequent topical application of GABA in concentration of 10 percent solution at the same site during the tubocurarine induced scratching movements caused either diminution or total cessation of both facilitation of the scratch

reflex as well as the movements of hind limbs. Thus the antagonism between central effect of d-tubocurarine and GABA as reported in cats is also found in dogs.

Key words : central effects d-tubocurarine GABA

THE NATURE OF ACETYLCHOLINE-ATROPINE ANTAGONISM AS DETERMINED BY SHILD'S pA METHOD ON THE ISOLATED GUINEA-PIG ILEUM. **S. A. Abbas and M. B. Gharpure.** *Department of Pharmacology, Medical College, Aurangabad.*

As judged from the pA_2 & pA_{10} (or pA_{11}) values, the acetylcholine-atropine antagonism is 'not competitive'. But it has been shown that if higher pA values are determined and compared, the antagonism is competitive.

In an attempt to explain this apparent discrepancy, it was assumed that the potentiating effect of sub-antagonistic concentrations of atropine on acetylcholine responses interferes with the accurate determination of its lower pA values. In order to determine the level upto which this interference is operative, eight pairs of pA values lying between (1) pA_2 — pA_{11} & (2) pA_{11} — pA_{101} have been determined. The results lead to the conclusion that even in low concentrations, atropine antagonizes acetylcholine competitively.

Key words : acetylcholine-atropine antagonism

MODIFICATION OF THE PRESSOR RESPONSES TO PHYSOSTIGMINE AND DMPP BY 6-HYDROXYDOPAMINE. **C. L. Kaul and R. S. Grewal.** *CIBA Research Centre, Aarey Road, Goregaon East, P.O. Box 9002, Bombay 63-NB.*

In urethane anaesthetized rats physostigmine and DMPP produced a marked increase in the adrenal catecholamine output in normal and 6-hydroxydopamine (6OHD) treated rats. Although 6 OHD pretreatment does not interfere with the release of catecholamines following physostigmine and DMPP, the blood pressure responses are substantially blocked. Similar block in the pressor response was seen in animals where demedullation was done before giving 6OHD. It is concluded that the increased catecholamine output from the adrenal glands does not contribute to the pressor response of either DMPP or physostigmine.

Key words : pressor response physostigmine 6-hydroxydopamine

FURTHER STUDIES ON THE ALPHA ADRENERGIC BLOCKING ACTION OF BETA ADRENERGIC BLOCKING AGENT. **P. R. Raghunath, H. M. Parikh and O. D. Gulati.** *Pharmacological Research Unit, Council of Scientific and Industrial Research and the Department of Pharmacology, Medical College, Baroda.*

Propranolol ($pA_2=4.90$); dichoroisoprenaline ($pA_2=4.29$); pronethalol ($pA_2=4.73$) (+) and (-) —INPEA ($pA_2=3.94$ and 3.97); 1-isoprophylamino-3-(4-indanoxyl) 2-propanol

(USVP 6524) ($PA_2=5.07$); butoxamine ($PA_2=4.44$) and bunolol ($PA_2=4.29$) blocked the responses of the isolated rat seminal vesicle to various sympathomimetic amines competitively. Sotalol, 1-(3-menthylphenoxy)-3-isopropylamino propanol (KO 592) and practolol blocked the responses to the amines noncompetitively. The alpha blocking action of phenoxybenzamine was prevented by USVP 6524, propranolol and noradrenaline. Sotalol which acted noncompetitively failed to prevent the action of phenoxybenzamine. It is concluded that the agents acting competitively did so by blocking alpha-adrenergic receptor. The shift of the agonist dose-response curves by the noncompetitive agents suggested a lack of "spare" alpha-adrenergic receptor for this tissue.

Key words : adrenergic receptor interaction

HYPOTHALAMIC INFLUENCE ON VENOUS TONE* **R. Bhattarai and S. K. Manchanda.** *Department of Physiology, All India Institute of Medical Sciences, New Delhi-16.*

In an earlier study we had reported the effects of bulbar stimulation on the tone of small veins and small arteries in the hind limb of dogs. These studies have been extended and the effects of stimulation of various hypothalamic regions have been observed.

Anterior hypothalamic stimulation in an area which controls processes mobilized for protection against increased temperature produces a marked decrease of venomotor tone along with increased rate of respiration. Arterial pressure and heart rate which were simultaneously recorded were only slightly affected. Stimulation of posterior hypothalamus produces a marked increase in venous tone which is accompanied by immense rise of arterial pressure and enhancement of respiratory rate and depth. This hypothalamic area has been implicated in the control of defence reaction and exercise.

So far 12 points in the anterior hypothalamus and 15 points in the posterior hypothalamus have produced similar types of fall and rise of venous tone respectively.

Key words : venomotor tone hypothalamus

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GENOTYPE FREQUENCIES AND EFFECT OF ABO BLOOD GROUPS UPON MATERNITY PATTERN. **Alice N. Abraham and K. Madhavankutty.** *Department of Physiology, Medical College, Trivandrum.*

The present study was attempted to determine the genotype frequencies and relationship, if any, between the ABO blood groups and maternity pattern (pregnancies, live-births and wastage).

The ABO blood groups of 336 couples and 387 pregnant women who attended SAI

hospital, Trivandrum were determined. Using the method of maximum likelihood of Fisher the genotype frequencies of the ABO blood groups of the husbands, wives and of the husband-wife combined group were found to be as follows :

	p	q	r
Husband	0.18312	0.14900	0.66784
Wife	0.17701	0.15167	0.67131
Combined group	0.18702	0.14926	0.66371

(p, q, r, represent the genotype frequencies of A, B and O Genes)

The data regarding the obstetric history of these patients were recorded and statistically analysed. It was observed that blood group of wife by itself did not influence the maternity pattern. Blood group of husband when considered alone had some effect on pregnancy and definite effect on livebirths. Wives of A and AB husbands had low livebirths or maximum pregnancy wastage.

The combined effect of the blood groups of the husband and wife has a significant role in the maternity pattern.

(a) The average number of pregnancies was higher when the husband or the wife or both belonged to blood group B than when they belonged to blood group A.

(b) Couples with A and B blood group combinations have the least average number of pregnancies, and a comparatively high average number of livebirths.

(c) Pregnancy wastage was found to be highest in OA couple (A denotes the blood group of husband), The latter two observations can be explained in terms of antigen-anti-body reaction.

Key Words : blood groups maternity patterns

TOTAL BODY SODIUM, SODIUM SPACE AND TOTAL BODY POTASSIUM IN INDIANS FROM WARM AND HUMID CLIMATE. **R. S. Satoskar, P. B. Parab, N. D. Desai and B. S. Kulkarni.** *Radioisotope Laboratory, Seth G. S. Medical College, Bombay.*

Total body sodium space and total body potassium was measured in healthy Indians from Bombay, by using ^{24}Na and ^{42}K . The mean value for total body exchangeable sodium was 45 m, equiv. per kg. Comparing these results with those reported from the temperate climate, these subjects had more total body sodium and less amount of total body potassium as expressed per kg body weight basis.

Key words : body Na and K climatic factors

EFFECTS OF INTRAPERITONEAL INJECTION OF TESTOSTERONE IN RATS. **Bilquis M. A. Rashid**
Upgraded Department of Physiology, Osmania Medical College, Hyderabad-1

This study has been carried out on male albino rat. The blood samples were collected from the external canthus of eye by means of microcapillary puncture technique, and were analysed for R.B.C., Hb., reticulocytes percent, cell/plasma ratio, MCV, MCH and MCHC before and after two successive I.P. injections of testosterone propionate 0.1 ml/kg. Statistically significant reticulocytic and erythrocytic responses and changes in MCV and MCHC values were observed.

Key words : testosterone propionate blood physiology

NEURAL CONTROL OF ERYTHROPOIESIS. **A. S. Chakrabarty, and S. K. Lal.** *Department of Physiology, J.I.P.M.E.R, Pondicherry.*

The role of autonomic nervous system was investigated on the regulation of erythropoiesis by determining reticulocyte response in albino rats after experimental haemorrhage. The controls the reticulocyte rhythm (oscillation) was determined by measurements of reticulocyte counts. Oscillation with a period of approximately 7 days was noted. Following haemorrhage chemical sympathectomy and parasympathectomy did not alter the reticulocyte response. This would suggest that the autonomic nervous system does not participate in the erythropoietic response following haemorrhage.

Key words : proteins haemorrhage autonomic nervous system erythropoiesis

STUDY OF SERUM COPPER LEVEL DURING PHYSIOLOGICAL AND HORMONAL VARIATIONS. **O.P. Bagga**
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Serum copper circulates mostly bound as ceruloplasmin, but 5% is loosely attached to other proteins. The copper level tends to be quite constant; however variations within a range of 30 μg are not uncommon. The present study was undertaken to investigate the changes in serum copper concentration during physiological hormonal variations.

Serial analysis of serum copper was made in twenty healthy normal non-pregnant women, and was found to range between 80-120 μg during the first week of menstrual cycle. It increased at the time of ovulation.

In the pregnant series a rise in serum copper was observed as early as fifth week of conception. The rise persisted throughout the period of gestation. However, in cases where

placental insufficiency occurred the concentration decreased suddenly. In abnormal pregnancies, especially in toxemia, the concentration of copper was abnormally high.

Key words : serum copper pregnancy menstrual cycle

COAGULATION OF BLOOD AND HYPERVITAMINOSIS A. **M.C. Variyar, R.P. Bhargava and Kiran Prahlad.** *Department of Biochemistry, Gandhi Medical College, Bhopal.*

The present investigation was undertaken to study the effects, if any, of hypervitaminosis A on coagulation of blood. Coagulation time, prothrombin time, fibrinogen content and vitamin A levels of rabbits were determined before and after administration of vitamin A. One lac units of vitamin A were administered by im injections bi-weekly. Observations were made on the 2nd day of the injection and thereafter at weekly intervals.

The coagulation time was distinctly prolonged, in a few cases by as much as 100 percent. There was no significant change in the prothrombin time. A distinct rise in the fibrinogen level was observed, A rise in the vitamin A level of blood was recorded. The investigation thus reveals a definite increase in the coagulation time after massive dosage of vitamin A.

The results may have an important clinical bearing.

Key words : vitamin A coagulation time

CEREBELLAR INFLUENCES ON THE MICTURITION REFLEX. **R. Bhattarai, R. Bijlani and S. K. Manchanda.** *Department of Physiology, All India Institute of Medical Sciences, New Delhi-16.*

Micturition reflex was induced in light anaesthetized cats by the injection of normal saline into the urinary bladder at the rate of 5 ml per min employing a continuous infusion pump. The act of micturition was observed by a continuous recording of the volume of urine voided and by direct visual observations of urethral twitchings. A simultaneous registration of intravesical pressure, femoral arterial pressure and respiration was also done.

Decerebellation led to an increase in the threshold of micturition, a decrease in the peak intravesical pressure developed during micturition and larger retention of urine when compared to the controls with intact cerebellum. These records, when coupled with the visual observations of the act of micturition, indicate that decerebellation markedly affects not only the micturition threshold but also the co-ordination of different components of the total act of micturition.

Fastigial nucleus stimulation during the saline injection also produced an increase in the threshold. But during this procedure the peak intravesical pressure was more and the evacuation was more complete when compared with the controls.

Key words : micturition reflex paleocerebellum fastigial nucleus

CEREBELLAR INFLUENCES ON CIRCULATORY RESPONSES INDUCED BY SCIATIC NERVE STIMULATION. **R. Bhattarai and S. K. Manchanda.** *Department of Physiology, All India Institute of Medical Sciences, New Delhi-16.*

In lightly anaesthetized cats (chloralose 50 mg/kg), sciatic nerve stimulation response was dependent on the frequency of stimulation pulses. Low frequency (1-15/sec) stimulation produced fall in arterial pressure and high frequency (30-200/sec) stimulation produced a rise in arterial pressure. At the cut-off range of frequency (20-25/sec) biphasic responses were quite frequent.

Cerebellar ablation by suction method did not affect the basal level of arterial pressure but diminished the magnitude of both pressor and depressor responses obtained by sciatic nerve stimulation. Decerebellation did not affect the temporal patterning of these responses. It seems that cerebellum has a tonic effect on both inhibitory and excitatory autonomic neurones in the medulla oblongata. Removal of cerebral cortex from the occipital region in amounts equal to that of cerebellum did not affect the sciatic nerve induced responses. The effects of decerebellation on the peripherally induced circulatory responses, therefore, are quite specific.

Key Words : decerebellation sciatic nerve pressor and depressor response

EXPLORATION OF CEREBELLUM IN RELATION TO GASTRO-INTESTINAL MOTILITY. **O.P. Tandon, I.S. Aneja and S.K. Manchanda.** *Department of Physiology, All India Institute of Medical Sciences, New Delhi.*

132 points in the cerebellar vermis and fastigial nucleus were electrically stimulated to observe the effects on gastric pressure and volume, and duodenal pressures in lightly anaesthetized cats. Significant increase in gastric pressure and decrease in volume were obtained on stimulation of the nodule. Although a large number of points in the fastigial nucleus and pyramis were also stimulated, the responses were not significant.

Changes in duodenal pressure which was simultaneously recorded gave variable responses so that no consistent conclusions could be made. All gastro-intestinal responses signifying both increase and decrease in motility were also accompanied by a rise in femoral arterial pressure which was simultaneously recorded.

These observations signify that although whole of cerebellar vermis is involved in influencing the motility, nodulus is the one which consistently affects the gastric smooth muscle so as to increase its tone and motility. Our observations in which multiple autonomic parameters were recorded also demonstrate that different parts of the cerebellar vermis cannot be parcellated so as to be grouped under sympathetic and parasympathetic systems.

Key words : gastric and duodenal motility paleocerebellum

CEREBELLUM AND CAROTID SINUS REFLEX ACTIVITY. **K. Seetha Devi and K. Somasekhara Reddy.**
Department of Physiology, Kurnool Medical College, Kurnool.

Decerebellation maintained the basal levels of blood pressure, under intravenous pentobarbitone sodium anaesthesia in dogs. Bilateral carotid occlusion did not produce any increase in blood pressure which was very marked before decerebellation, thereby showing that the cerebellum might be having a facilitatory effect on hypothalamic vasomotor activity or reticular activation system. In this connection it was observed that the adrenaline content of anterior lobe of the cerebellum increased with increase in blood pressure on bilateral carotid occlusion. This suggests that adrenaline may be a transmitter factor that activates cerebellum in influencing the hypothalamus to exert a modifying influence on the autonomic reflexes.

Key words : carotid occlusion response adrenaline content of cerebellum

INFLUENCE OF THE FASTIGIAL NUCLEUS OF THE CEREBELLUM ON AUTONOMIC AND SOMATIC SPINAL REFLEXES **N.K. Achari, S. AL-Ubaidy and C.B.B. Downman.** *Department of Physiology, Royal Free Hospital School of Medicine, 8 Hunter Street, London, WC1N 1BP.*

In the present investigation the effect of fastigial stimulation on spinal reflex activity has been studied.

Cats were anaesthetised with chloralose-urethane (35 mg and 70 mg/kg). The fastigial nucleus and brainstem were stimulated with single square pulses through stereotaxically orientated bipolar electrodes whose tip positions were confirmed histologically.

Fastigial stimulation produced discharge in cardiac, renal and intercostal nerves. Reflex discharges in these nerves could be evoked by intercostal afferent stimulation. When fastigial-evoked volleys preceded intercostal-evoked volleys at varying conditioning-testing (C-T) intervals, the reflex test volley was facilitated during the first 70 msec and depressed during the later 70-480 msec of the C-T intervals. Similar results were recorded when the test responses were elicited by stimulating ventral hypothalamus, ventrolateral medullary reticular substance, dorsolateral spinal cord or n. fastigijs itself. When a fastigial-evoked volley conditioned a dorsal root-evoked reflex volley in a ventral root, the facilitation/depression phases were shorter, about 45 to 65 msec respectively.

Fastigial stimulation also evoked dorsal root potentials (DRP) in thoracic and lumbar segments. When these responses preceded test DRPs evoked by stimulating intercostal or splanchnic nerves, the C-T curve showed early facilitation upto 30-35 msec, followed by depression upto 65-100 msec.

These results show that the fastigial nucleus of the cerebellum can both facilitate and

inhibit sympathetic and somatic spinal reflexes, and part of this influence may be at presympatric level.

Key words : festigial nucleus reflexes autonomic reflexes somatic

A CONTINUOUS TIDAL VOLUME RECORDER FABRICATED WITH INDIGENOUS COMPONENTS. **Khetarpal and B.K. Anand.** *Department of Physiology, All India Institute of Medical Science, New Delhi-16.*

The apparatus consists of electrical relays, the respirometer and a pressure pump. The electrical relays operate when the spirometer part on the recorder moves during breathing of the animal. The arrangement is such that every inspiration is measured and every expiration is expelled out. During the expiratory period the respirometer is filled by air from a positive pressure air pump. The air in the respirometer is always at atmospheric pressure.

This apparatus has the following essential qualities :

1. It can be used to record the tidal volume continuously for the number of hours without getting heated up.
2. Any gas mixture can be supplied to the animal to breathe using this apparatus.
3. If required, the expired gas can be collected from the outlet and used for analysis.
4. It works on 220 volts AC.

Key words : tidal volume recorder

VENTILATORY TESTS AND LUNG VOLUME STUDIES IN MADHYA PRADESH — PHYSIOLOGICAL NORMS. **R.P. Bhargava, S.M. Misra and N.K. Gupta.** *Departments of Physiology and Medicine, Gandhi Medical College, Bhopal.*

A large number of tests have been developed to assess the respiratory efficiency and to help in the diagnosis and treatment of patients with cardiopulmonary disorders. This investigation was undertaken with the object of collecting physiological norms for various tests in different age groups of either sex in healthy Indian subjects belonging to Madhya Pradesh.

Following values were determined in 180 subjects of either sex varying in age from 16 to 65 years :—

(1) respiratory rate (2) tidal volume (3) inspiratory reserve volume (4) expiratory reserve volume (5) inspiratory capacity (6) vital capacity (7) pulmonary ventilation (8) maximum breathe

ing capacity (9) breathing reserve (10) forced expiratory volume and (11) maximum mid-expiratory flow rate.

The values obtained have been compared with those of other workers from different parts of the country.

The values in case of males were higher than in females. The various values declined with age. There was a marked reduction in M.B.C. in the older age group, the value observed being about 45% of the of the ones in younger age group. F.E.V. was more or less constant in different age groups.

Key words : ventilatory tests population of Bhopal

ENERGY EXPENDITURE IN DESCENDING STEPS. **N.K. Satpathy.** *Department of Physiology, S.C.B. Medical College, Cuttack.*

Walking on level or ascending steps involves positive work as it is associated with shortening of muscles but work which involves forcible lengthening of muscles as performed during descent of steps, bring down of body or lowering of a weight involve negative work, for the mechanical work is being absorbed in the muscles. In the first case work is done in lifting the body against gravity over and above that done for giving the body a forward motion. During level walking change in gravity does not come into play, whereas during descent body moves with gravity. Experimental work on the energy expenditure during the descent of steps has been meagerly reported. In this study energy expenditure during descent of steps at different speeds was assessed to find out the optimum rate of descent. The experiment was carried out on 10 healthy male subjects aged between 21 and 36 years. By comparing the energy expenditure during descent with that during horizontal walking at speeds equal to that of descent the energy cost of negative work was found out at different speeds.

It was observed that there is an optimum rate of negative work and the energy cost is high at lower speeds of descent and is minimum at the optimum speed (17 to 22 meters/min). At higher speeds the energy cost mounts high, but remains more or less constant at still higher speeds of work.

Key words : negative work optimum rate energy expenditure

EFFECT OF EXERCISE ON MAXIMUM VOLUNTARY VENTILATION IN MALE ATHLETES AND NON-ATHLETES. **H.C. Gupta and I.A. Khan.** *Department of Physiology, M.G.M. Medical College, Indore.*

An investigation was undertaken to study the changes in M.V.V. in the healthy males-athletes and non-athletes, after physical exercise.

The mean values of M.V.V. with the S.D. for 100 subjects are given below :—

Non-Athletes	Mean Value (Liters/min)	S.D.
Before exercise	102.80	± 12.60
After exercise	108.20	± 14.43
Athletes		
(50 cases)		
Before exercise	126.18	± 16.04
After exercise	144.20	± 17.33

It is observed that the value of M.V.V. has been much increased in athletes after exercise than in non-athletes.

Key words : MVV physical exercise athletes

PHYSIOLOGICAL ASSESSMENT OF INDIAN ATHLETES. **M.S. Malhotra, S.S. Ramaswamy, N.T. Joseph and J. Sengupta.** *Defence Institute of Physiology and Allied Sciences, Delhi Cantt.-10.*

A comparison of 10 top Indian athletes and 10 non-athletes Indian soldiers has been made on their lung functions, maximum oxygen uptake, maximum exercise ventilation and maximum heart rate. No significant difference has been found between the lung volumes of athletes and non-athletes. The athletes, however, have significantly higher $\dot{V}O_2$ max ($P < 0.001$) and show a trend for higher v_E max. The maximum heart rate is significantly lower in the athletes ($P < 0.05$). Comparison of Indian athletes with the world-class athletes shows that the Indians have lower $\dot{V}O_2$ max and v_E max. In maximum heart rate and maximum lactic acid build-up, there is no difference.

Key words : Indian athletes physiological assessment

EFFECT OF ORAL INGESTION ON PALATABILITY SHIFTS IN HUMAN BEINGS. **V. Kumaraiah, K.N. Sharma and S. Dua-Sharma.** *Department of Physiology, St. John's Medical College, Bangalore.*

In our earlier studies, various nutritional states (fasting, after breakfast and lunch etc.) were shown to be linked with intensity/palatability scores of four primary taste qualities. The present work analyses the magnitude estimation of palatability and sensory quality under cross model procedures. Sweet (glucose), salt (NaCl), sour (citric acid), and bitter (quinine sulphate) solutions were presented in seven concentrations. The subject was asked to rate his judgement on 6 point scale for taste intensity and on 7 point scale for palatability. Each subject was tested

on three different days. In the initial phase of the study, two taste qualities were presented sequentially on day one. The remaining two taste qualities were presented on the other day. The initial phase results were analysed both for sensory intensity and for degree of palatability of each test solution. The most liked concentrations of sweet, salt, sour and bitter solutions were then presented in random order (crossed model procedure) to the subjects called on the third day, and constituted the second phase of the study.

It was found that the sensory intensity and maximal palatability of four fundamental taste qualities chosen by the subjects in the first phase, showed a shift both in intensity as well as in palatability scale when presented against different taste solutions. For example, the most preferred 0.018 M sour solution under fasting condition, with palatability score (P.S.) of 3.63 and intensity score (I.S.) of 1.42, showed P.S. of 3.22 and I.S. of 3.39, when judged against other most preferred taste qualities. Similar shifts were observed for other taste qualities also. It appears that not only the nutritional state, but also the temporal pattern of presentation is important in modulating taste-intensity as well as affective responses.

Key words : taste intensity palatability nutritional states

TASTE PREFERENCE IN CHRONIC ENERGY DEFICIENT RATS : EFFECT OF ACETONE. **R. Sreenivasa Rao and K.N. Sharma.** *Department of Physiology, St. John's Medical College, Bangalore.*

Depending upon the degree and duration of food deprivation, chronic energy deficient rats show proportionate increase in ingestion of positively flavoured solutions like saccharine, and decrease of negatively flavoured solutions like quinine. It is known that, amongst other changes, circulating ketone bodies may be present in larger amounts under chronic hunger. Investigations were therefore undertaken to see if acetone injections would in any way influence these taste reactions. Three groups of rats, adapted to 3 hr feeding schedule, were taken and were maintained on (i) 50% diet, (ii) 75% diet and (iii) 100% diet. Water was available ad libitum to all the groups. Each animal received at a fixed interval ip injection of 0.001 mg of acetone per 100 body weight and the one hr test trials run before and after injection. Single bottle tests of saccharine and quinine solutions were administered during test trials.

It is observed that acetone treated rats show enhanced over-reaction to taste qualities of solutions, as compared to untreated group of rats under similar conditions of nutritional status. For example, average group (i) rat, ingesting 2.8 ml saccharine and 0.3 ml quinine (per 100 g body weight) during test period, shows 4.1 ml intake of saccharine and 0.18 ml of quinine acetone injection.

Key words : taste preferences effect of acetone on taste.

RESPONSE-CHARACTERISTICS OF CHEMOCEPTIVE NEURONS IN FROG BRAIN STEM. **T. Ramakrishna K.N. Sharma and S. Dua-Sharma.** *Department of Biophysics, All India Institute of Mental Health, and Department of Physiology, St. John's Medical College, Bangalore.*

Response properties of chemoceptive neurons in the brain stem of single-pithed frog (*Rana tigrina*) were studied after topical application of glucose, sodium chloride, lysine, glycine and glutamic and aspartic acids to the gastric mucosa. Minute steel pins, tapered to 3-7 μ diameter and insulated except at the tip, were used for recording neuronal activity from gastric chemoceptive projection area (P4-6 & LO-1) in the brain stem. The evoked activity was displayed on the oscilloscope as well as recorded on an inkwriting dynograph. After 10.0-33.0 sec of topical application (1.0 ml, 0.2 M) the evoked discharge appeared and reached maximum activity in 2.0-4.0 min. Increasing the concentration to 0.4 M increased the magnitude of response with a reduced latency. Generally, $\text{glucose} > \text{NaCl} > \text{aminoacids}$ were effective in that order, and could be differentially identified. This is predominantly characterized by changes in the relative frequency of different parallel neurons as a response to changes in quality as well as intensity of stimulus. It appears that the relative amounts of activity (pattern) across the neurons ensures the quality coding whereas the 'amplitude' of this pattern indicates the intensity in this system.

Key words : gastric chemoreceptors chemoreceptor neurons frog's brainstem

EFFECT OF SEX HORMONES ON SOME ASPECTS OF LEARNING IN RATS. **P. Simhadri and Vijaya Devi Mathur.** *Department of Physiology, Institute of Medical Sciences, Hyderabad.*

Crystalline testosterone was topically applied to the reticular formation (R) through implanted canulae in rats which had been trained to obtain food by pressing a lever in sequential manner in a specially designed maze box. The testosterone and oestrogen in RF were found to change the temporal aspect of learning with respect to the initial interval in pressing the lever.

The control group showed progressive reduction in the initial from 4.18 min to 0.71 min. Testosterone group showed a remarkable improvement by reducing the initial intervals in the first few trials itself from 2.85 to 0.46 and then remained at an improved status throughout the rest of the trials at 0.45 min (mean). Oestrogen group on the other hand started with an interval of 4.16 min and upto 4th trial was identical with that of the control, but later trials showed reduced performance with increased interval to 1.34 min 7th to 8th trial.

The rate of improvement in the interval in consecutive trials showed a linear relationship for testosterone group whereas for oestrogen group there was considerable fluctuations.

Key words : learning oestrogens testosterone

EFFECT OF YEAST RNA ON THE LEARNING BEHAVIOUR IN ARTS. **P. Simhadri and Jaya Vikram Reddy.** *Department of Physiology, Institute of Medical Sciences, Hyderabad.*

Yeast RNA deposited into the reticular formation (RF) through a cannulae in rats showed a significant effect on learning of sequential pressings to obtain food from an electro-genetically controlled maze box designed in this laboratory. Reduction of the sequential omissions of the pressings in successive trials which indicate the learning by the rat was improved by RNA. In the initial trials the emissions ranged between 7 and 12 in control and 1 and 7 in RNA group. But in the last trials there were no omissions at all both in the control and RNA treated group. Ratio of the interval (time) between two consecutive correct responses showed a better performance by RNA group in the initial trials but later became identical with that of the control group. Ratios of the control and RNA groups were 4.2 and 0.8 respectively in the initial trials but became 0.6 in both the groups in the last trials, ranging between 0.6 and 0.8 in the last 3 trials.

Key words : learning RNA reticular formation

STUDIES ON FEEDING BEHAVIOUR OF THE ALBINO RAT UNDER LABORATORY AND EXPERIMENTAL SITUATIONS. **S.K. Lal, A.S. Chakrabarty and P. Chandrasekharan.** *Department of Physiology, I.I.P.M.E.R., Pondicherry-6.*

In albino rats trained in a Skinner box, the rate of bar-pressing was taken as the behavioural measure of hunger. The influence of social isolation was studied. Socially grouped rats, when compared with the isolated ones, showed an increase in the rate of bar-pressing. On the other hand there was decrease in motivation for getting the food in water-deprived rats. Cyproheptadine, in spite of its known effect of increased food consumption, decreased motivation to do work for obtaining the food.

Key words : motivation hunger social grouping

EFFECT OF SODIUM CHLORIDE IN THE SUPRA OPTIC NUCLEUS ON URINARY FLOW IN RATS. **P. Simhadri and Kumudini Mohan Ram.** *Department of Physiology, Institute of Medical Sciences, Hyderabad.*

Hypo and hypertonic saline was perfused through a coaxial micro-cannula into the supra optic nucleus (SON) in normal rats. Effects on the urinary flow were determined. Microperfusion with hypotonic saline induced an increased in the rate of flow from 4.02 (cms) to 5.12 within 5 min. and maintained at this rate upto 30 min. When hypertonic saline was perfused rate of flow was almost the same as that of control (4.83) upto 15 min when it

became less and after 30 min was only 1.66. When the percentage of variations in the rate of flow was computed there was a significant change from 5 min upto 25 min with hypertonic saline but it was significant only after 20 min with hypertonic saline.

Key words : supraoptic nuclei rate of urine flow

NERVOUS INFLUENCES ON THE URETERIC PERISTALTIC MOVEMENTS. **S. Logawney, G.S. Chhabra and B.K. Anand.** *Department of Physiology, All India Institute of Medical Sciences, New Delhi.*

Cats were anaesthetized with pentobarbitone sodium (35 mg/kg) and bipolar stimulating electrodcs were introduced in different regions of brain stereotaxically. Electrical activity of the ureteric muscle, which preceds each peristaltic wave was recorded with bipolar silver electrodes on an EEG machine. These wave were multiphasic, occurring 10 to 15 min with a voltage of 250-300 μ V and duration of 0.5-0.7 sec.

Stimulation of pontine region and superior colliculi increased the rate of peristaltic waves without changing the wave pattern, duration or voltage. In two animals stimulation produced marked irritability of the ureteric musculature as observed by appearance of extraspikes and occasional peristaltic waves with reversed polarity. Stimulation of periaqueductal region produced only increase in rate. Stimulation of middle hypothalamus decreased the rate but only a slight decrease in voltage was observed. Lesion in this area immediately produced slowing followed by quickening of peristaltic waves which recovered within few minutes.

Thus it seems that the initiation and propagation of the ureteric peristaltic waves can be modulated by the higher nervous influences.

Key words : ureteric activity CNS stimulation

URINARY EXCRETION OF ACID MUCOPOLYSACCHARIDES AND LYSOSOMAL ENZYMES IN KWASHIORKOR AND VITAMIN A DEFICIENT CHILDREN. **M. Mohanram and Vinodini Reddy.** *National Institute of Nutrition, Hyderabad.*

The effects of protein and vitamin A nutritional status on acid mucopolysaccharide metabolism have so far been studied only in animal experiments and the results are contradictory. The excretion of total and sulphated mucopolysaccharides (SMP) was therefore studied in vitamin A deficient children and in children suffering from kwashiorkor who also had associated deficiency of vitamin A.

The excretion of total and SMP was found to be significantly lower both in vitamin A deficient and children suffering from kwashiorkor. In vitamin A deficient children, the excretion of SMP increased significantly after treatment with vitamin A alone, while subjects

with kwashiorkor who were treated with high protein diet only, showed little change in SMP secretion. Children who received vitamin A supplements in addition to high protein diets showed a marked increase in the level of SMP.

Studies on the urinary excretion of two lysosomal enzymes arylsulphatase and acid phosphatase in children suffering from vitamin A deficiency showed that the initial levels of both the enzymes were significantly higher in these children as compared to the levels after treatment.

The results of these studies thus suggest that in vitamin A deficient states, metabolism of SMP is altered and stability of lysosomes is impaired.

Key words : vitamin A deficiency kwashiorkor lysosomal enzymes

KINETICS OF DENERVATION ATROPHY IN THE GASTROCNEMIUS MUSCLE OF FROG. **R.V. Krishnamoorthy and A. Singarachari.** *Department of Zoology, Bangalore University, Bangalore-1.*

Denervation studies in male frogs over a period of 220 days revealed that the rate of atrophy in the gastrocnemius muscle after denervation is not uniform and is dependent on the weight of the animal and period of denervation. The atrophic rate is linear up to 90 days of denervation; then it retards till 160 days and afterwards progressively increases its atrophic rate. The total DNA content per whole denervated muscle remained unaltered in comparison with the contralateral innervated one, indicating that the atrophy involves the wasting process of certain molecules and decrease in muscle fibre volume but not in number of cells. An analysis of atrophy gradients indicated the occurrence of five phases of denervation atrophy. Probably these phases involved different biochemical changes. In the inner phase of atrophy, the earlier studies indicated that the atrophy resulted in a high turnover rate of protein. In this study, during the linear phase of atrophy, an increase in lipase activity, a decrease in fat content and an increase in the degree of unsaturation of lipids were observed.

Key words : denervation atrophy muscle metabolism

BIOCHEMISTRY OF MUSCLE AND NON-GENETIC CAPACITY ADAPTATIONS OF CERTAIN POIKILOOTHERMS. **R.V. Krishnamoorthy.** *Department of Zoology, Bangalore University, Bangalore-1.*

The biochemistry of the muscle proteins represents a unique case of non-genetic capacity adaptations by certain poikilotherms in the fluctuating environment. Several changes in the enzymatic activities and in contractile or structural proteins of muscle lie at the fulcrum of the compensatory macromolecular mechanism needed for the adaptation to a new environment. These regulatory alterations are possible within the limits of adaptiveness of an animal, which in turn are genetically determined. Three cases of such adaptive mechanisms

from the author's work have been selected for discussion, viz. (i) an alteration of the myosin ATPase activity exhibited during the salinity adaptation of an estuarine crab; (ii) compensatory changes of GOT (transaminase) activity and *in vitro* synthesis of glycogen in the foot muscle of *Pila globosa*, and pond snail, due to aestivation during drought, and (iii) thermal adaptation of goldfish and frog during which the net ^{14}C leucine incorporation into different muscle proteins and myosin ATPase activity regulated. It is plausible that the central nervous system either by neurosecretion or by motoneuronal influence, triggers these changes. Ascorbic acid is accumulated in a greater concentration in the muscles of cold adapted frog and this may be related to the permeability changes of the muscles membrane. The increased ascorbic acid level may in its turn modify many enzyme activities, such as catalase, alkaline phosphatase etc.

Key words : poikilotherms muscle metabolism

METABOLIC DIFFERENTIATION OF FAST, SLOW AND CARDIAC MUSCLE OF CHICK DURING PRENATAL DEVELOPMENT. **E. Radha.** *Department of Zoology, Bangalore University, Bangalore-1.*

A study of *in vitro* glycogen synthesis of fast (PLD=posterior latissimus dorsi), slow (ALD=anterior latissimus dorsi) and cardiac muscles of chick at different stages of prenatal development revealed that the insulin potentiality of synthesis decreases in ALD and heart and increases in PLD with development. The adrenaline sensitivity of the muscle towards *in vitro* glycogenolysis is also varied in these muscles with development. The results of O_2 consumption, cytochrome oxidase activity and P/O ratios in the muscles showed that the ALD differentiates more into an aerobically geared type earlier. An analysis of certain key enzyme ratios like, aldolase/LDH, phosphorylase/hexokinase and the levels of lactate and pyruvate in the muscles at different stages of development revealed that from 16th day the PLD differentiates into an anaerobic type whereas the ALD and heart becomes stabilized to aerobic types.

Key words : prenatal development muscle metabolism differentiation during
metabolic development

BIOCHEMICAL STUDIES ON MAMMALIAN CARDIAC MUSCLES DISTRIBUTION PATTERN OF MYOGLOBIN IN DIFFERENT CHAMBERS OF HEART OF SOME MAMMALS. **K.M. Alexander.** *Department of Zoology, University of Kerala, Kariavattom, Kerala.*

Myoglobin plays a significant role in facilitation of oxygen entry into muscles and hence its role in cardiac physiology can never be underrated. Since no attempt has yet been made to study the distribution pattern of myoglobin in various chambers of heart of different mammals, the present study was undertaken.

Myoglobin has been assayed spectrophotometrically in right and left auricles and right and left ventricles of certain animals such as, musk, shrew, white rat, goat, ox and man. The

data so obtained suggest that there are definite variations in the distribution pattern of myoglobin, and in the concentrations of haem pigment both in different chambers of the heart as well as between the hearts belonging to different species.

The auricles in general are comparatively much lower in their myoglobin content than ventricles. In fact a definite gradation in the pigment concentration in various chambers was observed generally as: left auricle, right auricle, right ventricle and left ventricle. The highest myoglobin concentration has been observed in the left ventricle of ox and man.

Key words : myoglobin cardiac muscle

BLOCKADE OF NEUROMUSCULAR TRANSMISSION WITH ANTI-EPILEPTIC DRUGS. M. N. Jindal and V.K. Patel. *Department of Pharmacology, B.J. Medical College, Ahmedabad.*

Antiepileptic drugs are known to produce their action by central mechanisms. No published data are available on their peripheral actions on the skeletal muscles. Present report concerns the investigations carried out to evaluate this effect with representative members of four chemical groupings of known antiepileptic drugs viz. diphenyl hydantoin, trimethadione, ethosuccinamide and phenobarbitone.

Both *in vivo* and *in vitro* preparations were used employing amphibian, mammalian and avian skeletal muscle/muscle-nerve preparations. All the four compounds tested elicited a dose related blockade of the neuro-muscular transmission. The blockade was antagonised by physostigmine, potassium, calcium, adrenaline and isoprenaline to varying extent. The blockade was generally restricted to the neuromuscular junction since direct stimulation of skeletal muscles was little affected.

It was concluded that most anti-epileptic drugs used clinically possess curare-like properties in addition to their central actions.

Key Words : neuromuscular transmission antiepileptic drugs

2-[2-(3-PYRIDYL) VINYL]-3-OTOLYL-3 DIHYDROQUINAZOLINE-4-ONE (SRC-909)-PART I - GENERAL PHARMACOLOGY AND TOXICOLOGY. S.V. Gokhale, G.F. Shah and A.S. Nadkarni. *Srabhai Research Centre, Baroda.*

SRC-909 was synthesized as one of the quinazolinone derivatives. It was found to be a central nervous system depressant with an effect on neuromyal junction also.

In various screening procedures it was found to be more potent than methaqualone as a muscle relaxant having an equal duration of action.

It has local anaesthetic activity which is less in intensity and duration than that of lignocaine. It has little cardiovascular effect except at near lethal doses when it depresses the myocardium. Its therapeutic index is high. On chronic oral administration in rats it is well tolerated. At doses of 90 mg/kg or more per day for 6 weeks, it produces mild myocardial, hepatic and renal damage.

Key words : SRC-909 pharmacology toxicology

2-[2-(3-PYRIDYL)VINYL]-3-OTOLYL-3 DIHYDROQUINAZOLINE-4-ONE (SRC-909) - PART II. INFLUENCE ON THE RESPONSES OF THE VOLUNTARY MUSCLE TO CHOLINERGIC DRUGS AND NERVE STIMULATIONS. **P.R. Raghunath, D.S. Shah and O.D. Gulati.** *Department of Pharmacology, Medical College, Baroda.*

This work was started since SRC-909 was found to possess potent neuromuscular blocking property observed during the general screening programme (Part I). SRC-909 (1.4×10^{-4} M to 5.6×10^{-5} M) blocked responses of isolated frog rectus abdominis muscle to acetylcholine (2×10^{-6} M to 2×10^{-4} M) and carbachol (67×10^{-6} M to 2.6×10^{-4} M). The slopes of dose-response curves to these two agonists were changed and the maximal responses were depressed indicating noncompetitive antagonism. The noncompetitive dissociation constants (K's values) for different doses of the compound suggested that the noncompetitive antagonism was specific. Contractile responses of the muscle to potassium chloride (1×10^{-3} M) were also blocked. Responses of the phrenic nerve diaphragm preparation to indirect stimulation were blocked. The block was dose related (2.8×10^{-4} M to 1.1×10^{-3} M). Responses to direct stimulation were also partially blocked at a stage where responses to indirect stimulation were completely blocked. This, coupled with its block of cholinergic drug responses noncompetitively and also potassium chloride-induced contractions, indicates that the compound acts peripheral to the end plate.

Protection experiments further confirmed the non-competitive nature of antagonism.

Key words : SRC-909 voluntary muscle responses

THE ANTI-FERTILITY EFFECT OF LYNSTRENOL WITH MESTRANOL IN RATS. **Gnantham Glorin.** *Department of Physiology, Medical College, Kottayam.*

A study of the effect of combination 'pill' containing lynstrenol and mestranol (Lyn-diol 2:5 Organon) on fertility in rats was undertaken and its effect on the ovaries, uterus, adrenals and the pituitaries was investigated.

In mating experiments where the drug was administered 15 days prior to cohabitation and continued until the 7th day of pregnancy, it was found that the oral contraceptive produced a 100% inhibition of fertility. It also produced 100% inhibition of pregnancy, when it was administered from the first to the 7th day of pregnancy, showing its post-coital effect. During the period of administration the animals showed a continuous diestrus and resumed normal cycles within 7-9 days of the cessation of treatment.

The ovaries of the animals showed a reduction in weight, increase in the magnitude of follicular atresia and a complete absence of newly formed corpora lutea. The drug induced proliferative changes in the endometrium and myometrium. The initial stage of proliferation was replaced by regressive changes as the treatment was continued. No changes were produced in the adrenals. In the pituitary, the gonadotrophs were often found to be degranulated and devoid of nuclei, some being smaller in size.

Key words : anti-fertility effects lyndiol '2.5'

A COMPARATIVE STUDY OF THE ANTI-FERTILITY EFFECTS OF CYCLEA BURMANNI HK. f. & t. AND A HORMONAL CONTRACEPTIVE. **Gnanathankam Glorine.** Department of Physiology, Medical College, Kottayam.

Cyclea burmanni is one of the plants mentioned in Ayurvedic Medicine as having anti-fertility effect. The effect of the plant extract was compared with that of 'Lyndiol' 2.5 an oral contraceptive containing lynestrenol and mestranol. Vaginal smear studies, mating tests and histological studies were done on female rats.

In mating experiments in which the drugs were administered 15 days prior to cohabitation and continued until the 7th day of pregnancy, the plant extract had potent antifertility effect. A dose of 100 mg/100 g was almost as effective as Lyndiol which induced a 100% inhibition of fertility. The plant extract produced only some degree of inhibition of pregnancies when it was administered from the first to the 7th day of pregnancy where as Lyndiol had led to 100% inhibition. Unlike Lyndiol, the extract did not produce irregularities of oestrus cycles. Though the ovaries showed a reduction in weight, this was less as compared with Lyndiol. There was an increase in follicular atresia, and on prolonged treatment, the number of newly formed corpora lutea was reduced in contrast to Lyndiol which produced a complete absence of such corpora lutea. Both Lyndiol and *Cyclea* induced proliferative changes in the endometrium and the myometrium. The effect was quantitatively greater with Lyndiol. As the treatment was continued the proliferative changes were replaced by regressive changes. However, with *Cyclea* the myometrium did not undergo regression, The gonadotrophs of the pituitary showed certain degree of degranulation with loss of nuclei in some of the cells.

The experiments show that the leaves of *Cyclea burmanni* do have an anti-fertility effect.

It is possible that oestrogens and progesterone-like substances are present in the extract, which probably acting through the pituitary or directly on the ovaries, produce partial inhibition of ovarian function. These substances also make the endometrium unfavourable for implantation of the fertilised ovum.

Key words : antifertility effect *cyclea burmanni*

ANTI-INFLAMMATORY AND ANTI-HYALURONIDASE ACTIVITY OF VOLATILE OIL OF CURCUMA LONGA (HALDI). **S.S. Gupta, Dinesh Chandra and N. Mishra.** *Department of Pharmacology, Gandhi Medical College, Bhopal.*

Anti-inflammatory activity of *Curcuma longa* was investigated in three groups of albino rats by injecting 0.1 ml of 1% carragenin in the right hind paw. Hind paw volume upto a fixed mark above the ankle joint was measured, before and 3 hours after injection of carragenin. Rats of group II and III were given volatile oil of *C. Longa* (0.1 ml/kg) and cortisone acetate (10 mg/kg) orally one hr. prior to injection of carragenin. Hind paw volume was found to be 2.14 ± 0.24 and 2.56 ± 0.394 ml respectively as compared to 3.60 ± 0.24 ml in the controls. The anti-inflammatory activity against Freund adjuvant induced arthritis in rats, and against the development of tenosynovitis caused by injection of talc in the foot pad of pigeons was also studied in separate sets of experiments.

Anti-hyaluronidase activity of the volatile oil of *Curcuma longa* and cortisone acetate was investigated in three groups of mice. Group II and III mice were given volatile oil of *C. longa* (0.1 ml/kg) and cortisone acetate (10 mg/kg) intramuscularly one hr prior to injection of 10% solution of urethane (1.2 mg/kg) and hyaluronidase (0.001 ml/g). The time for loss of righting reflex was found to be 13.33 ± 1.60 and 13.60 ± 1.14 min. in group II and III as compared to 9.99 ± 0.07 min. in the control group, indicating delay in absorption of the anaesthetic due to inhibition of hyaluronidase in treated animals.

Key words : *curcuma-longa oil* anti-inflammatory activity

HYPOTENSIVE ACTION OF VERNONIA CINNERRA PRELIMINARY STUDY. **S. Venkitaraman and N. Radhakrishnan.** *CDRS Pharmacological Research Unit (C.C.R.I.M.H.), Department of Pharmacology, Medical College, Trivandrum.*

Routine pharmacological investigations on *Vernodia cinnera* (V. C.) revealed a possible hypotensive action for the crude hot water extract of the whole plant. In this study we report the effect of crude hot water extract of the whole plant (1% w/v) of V. C. on the blood pressure of anaesthetised dogs (pentobarbitone sodium 40 mg/kg).

Femoral vein was cannulated for the injection of drugs and carotid artery was cannulated for recording the blood pressure. Bilateral vagotomy was performed. A group of 4 tests was performed as cited below. (a) electrical stimulation of the peripheral vagal stump; (b) injection of 5 $\mu\text{g}/\text{kg}$ of acetylcholine; (c) occlusion of both carotid arteries for 45 sec. and (d) injection of 5 $\mu\text{g}/\text{kg}$ of epinephrine. The test substance was injected at a dose of 10 $\mu\text{g}/\text{kg}$ the effects recorded, and after 5 min. the group of tests was repeated. The extract itself produced a fall in B. P. The extract augmented the response to acetylcholine and vagal stimulation. Administration of atropine in a high dose (1.5 mg/kg) abolished the hypotensive effect of the extract. Implications of these observations are discussed.

Key words : *vernonia cinnera* hypotensive action

ANTIBACTERIAL ACTIVITY OF OXALIS CORNICULATA. S. Venkitaraman, V. Gopalakrishnan and N. Radhakrishnan. CDRS Pharmacological Research Unit (C.C.R.I.M.H.), Department of Pharmacology, Medical College, Trivandrum.

In Ayurveda, leaves of *Oxalis corniculata* boiled in butter milk given 2-3 times a day prove useful in chronic dysentery and enteritis. It has been reported to be active against staph. aureus but not against E. coli. The present study was undertaken to investigate the spectrum of activity of an alcoholic extract of the *oxalis corniculata* leaves against common entero-pathogens by plate dilution method. 1 ml of the alcoholic extract of the plant containing 26 mg of the residue, redissolved in 1% alcohol, was used for this experiment. Serial dilution of the extract was prepared in distilled water. Agar medium was melted and cooled to 48°C. To the bottom of a petridish 1 ml of each dilution was added and then 9 ml of the melted and cooled agar to get three different concentrations of the drug (26 mg/ml, 13 mg/ml and 6.5 mg/ml). One petridish containing 1% alcohol and 9 ml of agar served as control. Using a sterile cotton swab, a segment of each four plates was streaked with broth culture of the test organisms. The following organisms were used for the study: (1) Sh. flexneri (2) Sh. sonnei (3) S. typhi (4) E. coli (5) Staph. aureus (6) Staph. albus (7) Staph. citreus. After overnight incubation at 37°C the plates were examined for growth. Complete inhibition of growth was observed at the smallest concentration tried, for all organisms except E. coli which was not inhibited at 6.5 mg/ml concentration.

Key words : *oxalis corniculata* antibacterial action

ANDROGENIC AND ANABOLIC ACTIVITY OF SIDA RETUSA ROOT. S. Venkitaraman and N. Radhakrishnan. CDRS Pharmacological Research Unit (C.C.R.I.M.H.), Department of Pharmacology, Medical College, Trivandrum.

An increase in body weight has been observed by Ayurvedic physicians on patients under-

going treatment with a preparation of *Sida retusa* root (Sheerabala). This may be due to the presence of steroids having anabolic activity. Chemical fractionation of *Sida retusa* root carried out by the Chemical Unit, CDRS, University of Kerala, resulted in the isolation of a steroid. The isolated steroid was therefore investigated for (a) androgenic activity and (b) anabolic effect.

23 days old male albino rats were castrated and divided into three groups. Group I received the drug (10 mg/kg day as 1% soln. in sesame oil) subcutaneously for 7 days; Group II received testosterone propionate (1 mg/day) subcutaneously for 7 days; Group III received 1 ml of sesame oil/animal/day for the same period.

The rats were fed ad libitum. 30 days after the last injection, the animals were sacrificed by decapitation. The levator ani and seminal vesicles were dissected out and weighed on a torsion balance.

Statistically significant anabolic and androgenic effects were observed in the group receiving the drug.

Key words : *sida retusa* root androgenic activity

ANTI-INFLAMMATORY AND ANTI-ARTHRITIC ACTIVITY OF WITHANOLIDES. **P.D. Sethi and S. Sankarasubramanian.** *Department of Pharmacology, J.I.P.M.E.R., Pondicherry-6.*

Four C₂₈ steroidal lactones known as 'withanolides' isolated in our laboratory have been screened for their anti-inflammatory and anti-arthritis activity by four different methods: (I) carogenin induced oedema (II) granuloma pouch technique (III) cotton pellet granuloma technique and (IV) adjuvant arthritis. The parameters for measurement of the degree of inflammation were studied according to standard techniques.

The relative potencies of Withaferina withanone, the withanolide, m. p. 283-85° from *Withania coagulans* and a new withanolide m. p. 212° from *Physalis peruviana* have been evaluated with reference to hydrocortisone. Withaferina has been found to be as active as hydrocortisone by all the methods, and the withanolide from *P. peruviana* has significantly greater activity than hydrocortisone, (more than three times activity by the granuloma pouch technique).

Key words : withanolides anti-inflammatory activity

A PRELIMINARY REPORT OF PHARMACOLOGICAL ACTIONS OF SATPURUSH - AN INDIGENOUS PLANT GROWING IN SOUTHERN MAHARASHTRA. **N.M. Tiwari, B.D. Paranjpe, P. R. Kherdikar, L.B. Kantikar and B.K. Joshi.** *Miraj Medical College, Miraj, Maharashtra.*

Satpurush, a plant growing in southern Maharashtra has been used by bus drivers and conductors to postpone fatigue and to increase work performance. It is also reputed to

have beneficial action in asthma. The pharmacological action of 40% alcoholic extract of the leaves are studied. The extract produces sympathomimetic response of frog heart, rat and dog blood pressure. It produces contraction of frog rectus and potentiates acetylcholine response. It causes marked stimulation of respiration in anaesthetised dogs. It produces no effect on blood sugar on intravenous administration. The drug shows both sympathomimetic and cholinergic effects.

Key words : *satpurush* automatic effects

STUDIES ON KINO OF *Pterocarpus marsupium* **J.J. Trivedi and H.R. Parmar.** *Municipal Medical College and Gujarat College, Ahmedabad.*

Pterocarpus marsupium (Roxb) is popular in India for its medicinal uses. The kino of the wood is bitter with a bad taste and useful in diseases of body, a vulnerant, stympic tonic to liver, antipyretic, good for griping and biliousness, ophthalmia, boils, gleet and urinary discharge.

Kino contains kinonin and kino-red with small quantities of catechol, protocatechuic acid, gallic acid and gum.

The present work was undertaken to verify the claimed pharmacological action of the plant as well as to find out compounds responsible for the effect, and to isolate, if possible the active component.

The kino of the tree was extracted with successive solvents by Soxhlet apparatus and the fractions obtained were tested. The ethyl acetate portion was examined by various techniques of separation and was found to contain six components. The major portion was separated by column chromatography and its acetyl derivative was prepared.

The minerals, proteins, carbohydrates and tannin content of the kino was estimated.

The extract has no anthelmintic activity on earth worms, has no significant effect on the blood pressure and respiration of a dog and has no antidiabetic or antibacterial effect. When the drug was experimented on rabbits, it was found to have no harmful effect on kidney, stomach and other organs.

Key words : *pterocarpus marsupium* pharmacological actions

ANTIARRHYTHMIC AND LOCAL ANAESTHETIC ACTIONS OF USVC-6524 [1-ISOPROPYLAMINO-3-(4-INDANOXY)-2-PROPANOL HCl], A NEW ADRENERGIC BETA-RECEPTOR ANTAGONIST. **B.R. Madan.** *Department of Pharmacology, S.P. Medical College, Bikaner.*

USVC-6524 exhibited antiarrhythmic activity in the following test-procedures: (i) acety-

lcholine-induced atrial fibrillation; (ii) aconitine-induced atrial arrhythmia; (iii) adrenaline induced ventricular arrhythmia and (iv) quabain-induced ventricular tachycardia. It showed local anaesthetic property when tested by the following methods: (a) rabbit's cornea; (b) guinea-pig's intradermal wheal; and (c) rat's tail-pinch. In the light of previous observations, the present findings are interpreted as under:

1. Effectiveness in adrenaline and acetylcholine-induced arrhythmia is mediated through selective blockade of cardiac beta-receptors.
2. Role of adrenergic factor is not important in aconitine-induced arrhythmia.
3. Local anaesthetic property may be important for anti-arrhythmic effect in digitalis arrhythmia but betareceptor blockade enhances this effect.

Key words : USVC-6524 adrenergic beta receptor antagonist

TETRAZOLIUM SALTS : FURTHER STUDIES ON PHARMACOLOGICAL INTERACTIONS OF SOME TETRAZOLE
Pawan S. Chauhan and A.R. Biswas. *Biochemistry and Food Technology Division, Bhabha Atomic Research Centre, Trombay, Bombay-85 and Department of Pharmacology, J.I.P.M.E.R., Pondicherry-6.*

It was recently demonstrated by one of us that triphenyl tetrazolium chloride (TTC) antagonizes acetylcholine (Ach) response on frog rectus abdominis muscle. Subsequently, butyl tetrazolium (BT), a ditetrazole, was found to antagonize adrenaline (A)-induced contraction of the cat nictitating membrane and its pressor effects in rat and cat. In view of these and other observations, interaction of BT, TTC and tetrazolium violet (VT) with various pharmacological agonists on blood pressure and spleen in dog have been investigated.

BT antagonized the pressor response to A and A-induced contraction of the dog spleen. The antagonism was dose-dependent and surmountable in nature and occurred within 15 min after intravenous BT administration. Response to A on spleen was more susceptible to blockade by BT. This tetrazole, however, failed to alter pressor effects of Noradrenaline (NA) but profoundly blocked NA-induced contractions of the spleen in a competitive manner. Response to Ach and histamine (H) on blood pressure and spleen remained unaffected by BT, these were, however, blocked by atropine and mepyramine, respectively. Failure of TTC & VT to alter any of the effects of agonists examined seems to be related to greater number of tertiary amino groups in the ditetrazole (BT).

Key words : tetrazolium salts

VITAMIN E ESTERASE OF CHICKEN TISSUES. N. Jayanthi Bai, George Thomas and S. Krishnamurthy
Department of Biochemistry, T.D. Medical College, Alleppey.

Vitamin E is absorbed through the lymphatic system along with triglycerides ind-

...ating that esterified tocopherol undergoes hydrolysis in the intestines. However there have been no reports so far concerning the mechanism of hydrolysis of tocopherol esters and hence this study. Chickens of both sexes were sacrificed, blood was drawn out by heart puncture, and the other tissues, liver, intestines, heart, kidneys and pancreas, were removed, washed free of blood with ice cooled 0.25 M sucrose and stored at 4°C. All the tissues were homogenised in 10 volumes of 22 M sucrose. DL- α -tocopherol ester in required amounts was dissolved in 0.05 ml absolute ethanol and a uniform suspension prepared by adding 3 ml of buffer; the reaction started with 1 ml of enzyme homogenate. (incubated at 37°C). The activity was calculated by determining the amount of free-tocopherol liberated by Emeric Engel reaction. The results obtained showed that (1) unlike esterase activity, vitamin E esterase required obligatory presence of bile salts, (2) vitamin E esterase is present only in pancreas and liver, while esterase activity was present in liver, pancreas, intestines, kidneys and blood plasma, (3) the liver vitamin E esterase has the optimum pH 8.6 (veronal buffer 0.1M) optimum time 3 hr and optimum enzyme concentration 150 mg wet weight of liver tissue in 5 ml incubation mixtures. The relative absence of vitamin E esterase in the intestine is interesting, and it is concluded that pancreatic vitamin E esterase is the physiologically active one for the digestion and absorption of α -tocopherol esters.

Key words :

vitamin E esterase

PREVENTION OF VITAMIN A INDUCED HAEMOLYSIS BY VITAMIN E, D, AND GLUTATHIONE. V.N.R. Kartha, M.S.P. Nair and S. Krishnamurthy Department of Biochemistry, T.D. Medical College, Alleppey.

In *in-vitro* systems, it has been demonstrated that vitamin A alcohol induces lysis of erythrocytes. However it has been recently reported that α -tocopherol acetate, squalene or vitamin k, inhibits haemolysis by vitamin A alcohol which is due probably to lipid peroxidation because the compounds that protect from peroxidation usually also prevent haemolysis. This is compatible with our earlier observation on the mechanism of dialuric acid induced haemolysis of erythrocytes from vitamin E deficient rats, which could be prevented by dietary selenium or supplements of vitamin E. However, the results presented here demonstrate that haemolysis of normal human and rabbit erythrocytes is not related to lipid peroxidation as measured by the amounts of malonic dialdehyde formation with thiobarbituric acid, contrary to the observation in the case of vitamin E depleted cells. Further, although α -tocopherol and tocopherol acetate could inhibit haemolysis, none of the synthetic and more potent anti-oxidants tested were effective. On the other hand sulphhydryl compounds (reduced glutathione and cystein) were quite effective. There was no apparent impairment of glutathione stability during the haemolysis. Vitamin D (synthetic calciferol) is as potent as α -tocopherol in preventing haemolysis. It is therefore possible that the oxidative destruction

of vitamin A alcohol by the red cells may initiate the damage of the cellular membrane leading to lysis without any co-oxidation of the lipid moieties of the erythrocyte membrane.

Key words : vitamin A,E,D. haemolysis

LECITHIN CHOLESTEROL ACYL TRANSFERASE AND SERUM CHOLESTEROL LEVEL. **N. Jayanthi Bai, K.S. Rajasekharan Pillai and S. Krishnamurthy.** *Department of Biochemistry, T.D. Medical College, Alleppey.*

The esterifying system of plasma cholesterol is due to the lecithin cholesterol acyl transferase system (L. C. A. T.) which help the transfer of fatty acid from the 2-position of lecithin to the hydroxyl group of cholesterol. The role of this enzyme in controlling and regulating serum cholesterol level is the object of this study. From a study of the routine clinical investigation-samples, it was observed that in hypercholestraemia the increase is in the proportion of the esterified cholesterol as related to free cholesterol. By using human plasma as combined source of enzyme and substrate, within 3 hr 45% esterification was observed. The pH optimum of the plasma esterifying L. C. A. T. enzyme was found to be 7.4 in veronal buffer. Using plasma containing total cholesterol from 100 to 350 mg%, the degree of esterification showed a proportionate increase with increasing amount of blood cholesterol. In *in vitro* esterification studies using small amount of plasma (.25ml) showed high specificity towards linoleic and arachidonic acid esterification with cholesterol which could explain the predominant poly-unsaturated cholesterol esters in blood, it may be concluded that L. C. A. T. level in blood is probably the main unknown factor that determines the level of circulating cholesterol and fluctuations at any given time eg. seasonal changes, environmental factors, stress, diet etc.

Key words : L.C.A.T. serum cholesterol

SOLUBILIZATION AND PROPERTIES OF LIPASE FROM *SESAMUM INDICUM* (GINGELLY) SEEDS. **N. Jayanthi Bai, K. Sreekumar and S. Krishnamurthy.** *Department of Biochemistry, T.D. Medical College, Alleppey.*

Soaked seeds of *Sesamum indicum* (Gingelly) were found to contain a slow acting acid lipase. The crude enzyme was active towards the endogenous substrate in the fatty emulsion and the acetone powder of the seeds was active against added triglycerides, long chain fatty acid esters or water miscible substrate, Tween-80. The crude enzyme preparation did not seem to require any added co-factor and unlike castor-bean lipase, did not require any lipid co-factor. The enzyme has been solubilized in 0.88 M sucrose. The purified enzyme required the obligatory presence of a suitable emulsifier (gum acacia) for activity towards water insoluble substrates. Other emulsifiers like autocholate, albumin, and triton-X-100 were inhibitory. The study

of influence of metallic ions showed that like plant lipase, in general, heavy metals (Cd, Hg) were inhibitory while Ca activated the enzyme. The purified enzyme appeared to contain a sulphhydryl group since S-H inhibitors abolished the activity of the enzyme, which could be reactivated by cysteine or glutathione.

Key words : *sesamum indicum* S-H group

BETA CAROTENE METABOLISM IN DIABETES. **K. Ramachandran.** *Department of Biochemistry, Medical College, Kottayam.*

The serum levels of carotene and vitamin A in diabetic and normal subjects were studied. There was no significant difference in the levels between the two groups. Carotenaemia was not seen in any of the diabetic subjects. The rise in serum vitamin A level subsequent to the oral administration of beta carotene was similar in magnitude in both diabetics and normal controls, thereby ruling out any defect in the absorption or conversion of beta carotene to vitamin A in diabetes.

Key words : diabetes vitamin A

EFFECT OF HEAT STRESS ON TISSUE TRANSAMINASES. **V.V. Subbarao, G.C. Nanawati, M.L. Gupta and R.L. Ajmera.** *Upgraded Department of Physiology and Biochemistry, S.M.S. Medical College, Jaipur.*

Knowledge on the enzymatic changes at the tissue level in relation to stress is far from complete. Therefore the present investigation is sought to find out the enzymatic alterations in various tissues during heat stress and to correlate with the metabolic effects. Albino rats were exposed to a heat stress of $39^{\circ}\text{C} \pm 1^{\circ}\text{C}$ for 60 min. and 90 min. The changes in transaminases of brain, kidney and liver have been studied. The glutamic oxalo-acetate transaminase activity of brain and kidney showed an increase, with a reduction in the activity of glutamic pyruvate transaminase while the hepatic transaminases showed higher activity.

Key words : heat stress tissue transaminases

ROLE OF THE VAGUS NERVE IN STRESS-INDUCED GASTRIC ULCERS IN THE ALBINO RAT. **A.K. Ganguly and S.K. Lal.** *Department of Physiology, J.I.P.M.E.R., Pondicherry-6.*

The results of extensive experiments on rats to study the stress induced gastric ulcers suggest that the hypothalamus may mediate its influence on the gastric secretion in two

It appears that at high altitude the mechanism for blood sugar control is re-set at a higher level during the process of acclimatisation.

Key words : high altitude glucose tolerance

EXERCISE DYSPNOEA AND WORK PERFORMANCE AT SEA LEVEL AND AT ALTITUDE. **J. Sen Gupta, M.S. Malhotra and S.S. Ramaswamy.** *Defence Institute of Physiology and Allied Sciences, Delhi Cantt-10.*

Studies have been carried out on 47 low-landers at 4000 m altitude after 24 months of acclimatisation and again at near sea level after 3 months of return from altitude estimating their performance in endurance step tests, time in 1600 m run and VO_2 max, exercise ventilation, maximum breathing capacity and exercise dyspnoea expressed as Dyspnoeic Index. Results show that dyspnoeic index is well correlated ($r = -0.8$) with duration in endurance step tests. The quantitative relationship between this index and the work capacity was found to have a general validity in respect of different individuals, altitudes and rate of work.

Key words : high altitude exercise dyspnoea work performance

ALTITUDE AND IDEAS OF NON-MEDICAL COLLEGE STUDENTS ABOUT FAMILY PLANNING. **Jawalekar and V.S. Mathur.** *Department of Physiology, Dr.V.M. Medical College, Sholapur-3.*

This study was planned to learn the extent of prevalent knowledge and attitude towards family planning of the senior students in arts and science colleges. The data was collected from about three hundred students of both sexes between the age of 18-24 years. The students were from senior B.Sc. and B.A. classes. A questionnaire containing about 10 questions was administered to them by their teacher in class room time. They were requested to write down the answer without hesitation or fear and return the papers to us. From the analysis of the data, it is seen that barring a few exceptions, the students do not have any idea about what is conception, how it occurs and how it can be prevented. They are keen to have scientific knowledge about family planning, so that it will help them to have a small sized family with ideal spacing of births. It is therefore, suggested, that at least those students who are in the final year of their college study should be given a session to discuss their role in family, attitude towards planning their family size and the population problem.

Key words : attitudes and ideas family planning

THE VARIABILITY IN OVARIAN HISTOLOGY OF MONKEYS SHOWING AMENORRHOEA. **S.R. Gupta and B.K. Anand.** *Department of Physiology, All India Institute of Medical Sciences, New Delhi-16.*

This study was done to investigate the state of ovaries in monkeys showing amenorrhoea irrespective of the fact that the amenorrhoea may be associated with experimental stress, prolonged captivity or a chronic debilitating disease. Monkeys with history of regular menstrual cycles and having developed amenorrhoea after being fed protein deficient diet were also included in this study. The animals were sacrificed at varying durations of amenorrhoea. The ovaries of all monkeys were serially sectioned and histologically examined for maturing follicles, signs of impending ovulation and corpora lutea. The data were co-related with the menstrual history.

With amenorrhoea of 50-90 days, the monkey ovaries showed number of growing maturing follicles upto antrum stage with absence of fresh corpora lutea. These ovaries often showed a typical punched appearance with numerous antrum follicles and occasional ovarian cysts. Such an appearance was seen in monkeys having nutritional amenorrhoea, amenorrhoea with abdominal tuberculosis, following an arrival into new laboratory conditions, and during recovery to normal cycles after a nutritional stress.

With amenorrhoea for more than 3 months the ovary often showed lack of maturing follicles as well as corpora lutea. Prolonged menstrual cycles such as of 30 to 50 days were seen to be associated with a persisting corpora lutea in two monkeys.

Key words : amenorrhea ovarian histology

EFFECT OF PROTEIN DEFICIENCY ON RESPONSE OF OVARIES TO EXOGENOUS GONADOTROPHINS. **S.R. Gupta, R. Hanumantha Rao and B.K. Anand.** *Department of Physiology, All India Institute of Medical Sciences, New Delhi-16.*

Experimental protein deficiency disrupts oestrus cycles in the rats and menstrual cycles in the monkeys. The cause appears to be disturbed function of ovary, which may fail to maintain corpora lutea or to ovulate. Lack of circulating gonadotrophins and/or altered response of the ovaries to circulating gonadotrophins may show such results. The latter possibility has been investigated.

Female rats were fed protein deficient diet, and response of their ovaries to injection of P.M.S. followed by L.H. was measured using parameters of vaginal cytology, ovarian and uterine weight, histology and ovarian ascorbic acid depletion.

The results show that adult deficient rats showing anaestrus, begin to show estrus in vaginal smears after injection of exogenous gonadotrophins and their ovarian ascorbic acid depletion is comparable to that observed in control rats.

The deficient immature rats may show delay in vaginal opening but the rise in uterine weight and ovarian ascorbic acid depletion in response to gonadotrophins is no way diminished.

Key words : protein deficiency gonadotrophin response

INFLUENCES OF GONADAL HORMONES AND GENITAL AFFERENTS ON EEG ACTIVITY OF THE HYPOTHALAMUS IN ADULT MALE MONKEYS. **G.S. Chhina, H.K. Kang, Baldev Singh and B.K. Anand.**
Department of Physiology, All India Institute of Medical Sciences, New Delhi-16.

Considerable information is available regarding the neuro-humoral feedbacks in the female. Little is known about their role in the male. In this study, effects of genital stimulation on the EEG recorded from different areas of the hypothalamus were observed in 25 adult male monkeys. Effect of hormone treatment in normal and gonadectomised monkeys was observed.

The genital stimulation in normal animals produced a focal slowing in the VMN area, whereas, the duration of faster frequencies showed an increased in preoptic area. The genital stimulation after the injection of testosterone produced faster EEG in the VMN and slow waves in the anterior hypothalamic region. With the continued injections slowing could be recorded even from the posterior hypothalamic area. After gonadectomy EEG responses similar to that of the normal monkeys were obtained. Similarly, the genital stimulation following the hormone treatment resulted in the EEG changes almost identical with those in normal animals after the same procedure; only their latency was decreased.

The primary influence of genital afferents and gonadal hormone in smaller amount appears to produce focal inhibition of VMN. The higher amount of hormone in the body produces excitatory activity in this area with a simultaneous inhibition of the anterior region. The posterior hypothalamic area inhibited by the incoming genital afferent information with continued increase in amounts of circulating hormone.

Key words : male monkeys hypothalamus hormonal feedback

EFFECTS OF CYPROHEPTADINE AND METHYSERGIDE ON 5-HYDROXYTRYPTAMINE (SEROTONIN)-INDUCED EMBRYOTOXICITY IN RATS. **K. Krishna Rao. S. V. Medical College, Tirupati, A.P.**

The effects of two anti-serotonin compounds, cyproheptadine and methysergide on serotonin-induced embryotoxicity were investigated in the present work. Albino rats weighing between 150-200 g were dosed with serotonin (10 mg/kg) on day 15 of pregnancy and killed on day 20 for examination, the day of finding sperms in vagina smear being counted as

occurred at this wave length, thus indicating a peak in the difference spectrum plotted. Bleaching the extract at 630 $m\mu$ for 15 sec, 30 sec and 1 min resulted in a gradual and steep wise decrement in the optical density measured, the loss being more with the increased duration of bleaching, except at shorter wave lengths viz. 320 $m\mu$ -330 $m\mu$ where there was a rise in O.D. The results seem to indicate that the visual pigment extracted is a porphyropsin which may be termed as Vp 550.

Key words : etroplus suratensis visual pigment

A REPORT ON THE PHYSIOLOGY OF THE MUSK SHREW, SUNCUS MURINUS VIRIDESCENS. M. Balakrishnan, K.M. Alexander and G.N. Ambikatmajan Nair. *Department of Zoology, University of Kerala, Kariavattom and Department of Physiology, Medical College, Trivandrum.*

Although the insectivores have a wide distribution only scant data are available on their physiology. The present account deals with a report on some physiological aspects of the musk shrew, *Suncus murinus viridescens*.

The body temperature, certain aspects of hematology, respiratory, metabolic and heart rates and electro-cardiogram of the musk shrew have been recorded. The rectal temperature was comparatively lower (34.15°C). Hematological data reveal an erythrocyte count of 9.63 million/cmm in males and 8.45 million/cmm in females. The male shrew had a total W.B.C. count of 134475/cmm whereas the females had 15217/cmm W.B.C. Differential count indicated a high percentage of neutrophils.

No significant variation could be observed in the respiratory rates between the two sexes, males having 132/min and females 129 min. The metabolic rate exhibited a definite correlation to the activity rhythm of the shrew with a maximum during night and minimum during noon. The heart rate was slightly higher in males (556/min) than female (540/min). The electrocardiogram exhibited a similarity to the human ECG.

Observations on shrews acclimated to laboratory conditions indicate a decline in the metabolic rate in accordance with the duration of acclimation. The heart rate on the contrary showed a slight increase.

Keywords : musk shrew laboratory acclimation

STUDY ON COLOUR BLINDNESS. Puthuraya Padmanabha and C.S. Narayana Shetty. *Department of Physiology, Bangalore Medical College, Bangalore.*

The present report deals with the preliminary work done on colour blindness among Bangaloreans of age group 18-25 and 30-45 years, of both sexes. Mostly the medical students

are taken as subjects for this survey. The colour blindness is determined by using Shinobu Shihara's Chart.

Among the 200 cases so far investigated two are found to be colour blind. Since we know that colour blindness is a sex linked disease, genetic studies are proposed to be undertaken.

Key words : colour blindness

EFFECT OF PROSTAGLANDINS (PGE_1) ON EEG AND SINGLE NEURON ACTIVITY OF PARIETAL CORTEX OF MONKEY. **T. Desiraju and B.K. Anand.** *Department of Physiology, All India Institute of Medical Sciences, New Delhi.*

In order to study the effects of PGE_1 on nervous system, the chemical has been administered both systemically as well as into the cerebral ventricles in monkeys in both chronic and acute experiments. PGE_1 in chronic unanaesthetized monkeys caused drowsiness and slow waves in EEG. In acute experiments, intra-ventricular administration of PGE_1 caused a slight potentiation of thalamically evoked potentials and an increase of spontaneous frequency of discharge of neurons of the cortex.

Key words : prostaglandins single unit activity

EFFECT OF PRIOR EXERCISE ON BODY WEIGHT LOSS AND RUNNING ACTIVITY DURING A PERIOD OF REDUCED FOOD INTAKE. **R. Bullard, R. Pierotti and G. Collier.** *Department of Physiology, Christian Medical College, Vellore-2.*

It has been shown that food deprivation causes an increase in running activity along with body weight loss in the rat. The purpose of the present study was to assess the effect of previous running activity on the body weight loss and running activity during a period of reduced food intake. Daily measurements of body weight, food and water intake and wheel running activity were taken.

The body weight loss occurring with a reduced food intake in previously active rats is significantly greater than that in rats with no previous exposure to activity. The results suggest this may be due to (1) the mobilization of fat from the body fat stores during the previous activity causing a lower body fat level at the beginning of the reduced food intake period and/or (2) the mobilization of more body fat by a large increase in running activity during the reduced food intake period. Running activity may serve as a homeostatic mechanism whereby body fat is mobilized as a primary fuel source when sufficient food is not available.

Key words : weight loss food intake fat mobilization

blastine treated animals bear several points of similarity. Hence vinblastine treated rats were considered to provide a suitable model for such studies.

Albino rats weighing 100-150 g were used for the present study. The animals were kept on the standard laboratory diet. Into one group of animals vinblastine was injected intravenously in the doses of 25 mg/kg. Four hr after the injection of the drug, the intestinal transport of aminoacids L-proline and glycine was studied. Similar experiments were performed on another group of animals used as controls

Key words : amino acid transport vinblastine sulphate

EFFECTS OF GLUCOCORTICOIDS ON DRUG INDUCED CATALEPSY, PTOSIS, AND INHIBITION OF CONDITIONED RESPONSE. **A.C. Borah and A. Ahmed.** *Department of Pharmacology, Assam Medical College, Dibrugarh.*

Since glucocorticoids (cortisone and hydrocortisone) have been reported to exert an anaesthetic effect on anaesthetised and morphine treated rats, an attempt was made to study the influence of dexamethasone and hydrocortisone on catalepsy, ptosis and inhibition of conditioned response induced by various doses of chlorpromazine, prochlorperazine, haloperidol and reserpine. The investigation showed that dexamethasone 4 mg/kg s.c. and hydrocortisone 250 mg/kg s.c. had no ability to prevent the occurrence of the above signs induced by the tranquilizers.

Key words : glucocorticoids conditioned responses

INTERACTION OF TOLBUTAMIDE, NEUROLEPTICS AND DIPHENHYDRAMINE. **K. Samu Iyer and A. Narayanankutty Menon.** *Department of Pharmacology, Medical College, Calicut.*

The effect of concurrent administration of neuroleptics and diphenhydramine on the activity of tolbutamide was studied in rabbits and humans. Diphenhydramine does not modify the activity of tolbutamide. Chlorpromazine antagonised the hypoglycaemia produced by tolbutamide in rabbits and human beings without affecting hypoglycaemia produced by insulin, it is likely that chlorpromazine inhibits the response of the pancreas to tolbutamide. This type of action is analogous to the action of the drug on other endocrine glands.

Key words : diphenhydramine neuroleptics tolbutamide

After atropinisation and splanchnic nerve section, there was no degranulation in the two types of cells of the medulla. Pentolinium had no effect in these animals; so also when pentolinium was injected directly into the adrenal artery. There was no increase in the catecholamine content of adrenal venous blood. These experiments tend to prove that mechanism of liberation of noradrenaline by pentolinium is a nervous one.

Key words : noradrenaline release pentolinium

EFFECT OF POST HEPATECTOMY SERUM ON LIVER REGENERATION IN RATS. **A. Namasivayam and N. Padmanabhan.** *Institute of Physiology, Madras Medical College, Madras.*

The influence of post hepatectomy serum (PHS) obtained 24 and 48 hr after partial hepatectomy on hepatic regeneration was studied in normal and partially hepatectomized animals. The effect of partial hepatectomy in one of the parabiotic pair on the regenerating potential of the intact liver of its partner was also observed. The percentage regeneration of the liver and the mitotic index in these experimental animals were compared with their respective controls.

It was found that the normal serum had no inhibitory effect on the regenerating liver. The serum taken from partially hepatectomized animals when injected into normal rats increased the mitotic rate in these livers. Injection of PHS to partially hepatectomized animals was ineffective in augmenting mitotic activity. Partial hepatectomy in one of the animals in a parabiotic pair increased the mitotic activity in the liver of the unoperated animal. In all these animals the percentage of regeneration was not significantly altered.

Key words : post-hepatectomy serum liver regeneration

THE MODULATORY INFLUENCES OF BRAIN-STEM CENTRES ON THE REFLEX CONTRACTIONS OF THE (URINARY BLADDER). **M.G. Gogate, R.A. Dhume and J. Mascarenhas.** *Department of Physiology, Goa Medical College, Goa.*

A COMPARATIVE STUDY OF THE EFFECTS OF GALLAMINE TRIETHIODIDE (FLAXEDIL) ON CHOLINERGIC RECEPTORS. **R.A. Dhume and M.G. Gogate.** *Department of Physiology, Goa Medical College, Goa.*

EFFECT OF CANNABIS INDICA ON AMINO ACID CONTENTS OF RAT BRAIN. **C.M. Soni, M.L. Gupta and S.D. Bhardwaj.** *Department of Physiology and Biochemistry, S. M. S. Medical College, Jaipur.*

EVALUATION OF NATURE OF ADRENERGIC RECEPTORS IN ISOLATED RAT STOMACH FUNDAL STRIP. **A.Y. Nimbkar and B.B. Gaitonde.** *Department of Pharmacology, Grant Medical College, Bombay-8.*

SYMPATHOMIMETIC ACTIVITY OF ALBIZZIA LEEBECK—A PRELIMINARY STUDY. **R.S. Rathor, R. Chakrabarty and P.K. Das.** *Department of Pharmacology, Institute of Medical Sciences, Banaras Hindu University, Varanasi-5.*

STUDIES OF ANAEMIC INTESTINE. **S. D. Bhardwaj, M.L. Gupta and I. Shukla.** *Upgraded Department of Physiology and Biochemistry, S.M.S. Medical College, Jaipur.*

STUDIES ON THE MECHANISM OF INTESTINAL ABSORPTION ON IRON IN ANAEMIA. **M.L. Gupta, S.D. Bhardwaj and I. Shukla.** *Upgraded Department of Physiology and Biochemistry, S.M.S. Medical College, Jaipur.*

CYTOCHEMICAL EVALUATION OF ALKALINE PHOSPHATASE IN LEUKOCYTE. **J. K. Sengupta.** *Department of Physiology, J.J.M. Medical College, Davangere-4 (Mysore).*

ENHANCEMENT OF THE DIURETIC EFFECT OF CERTAIN DRUGS BY INSULIN. **D.S. Shrotri.** *Department of Pharmacology, Medical College, Aurangabad.*

INTER-RELATIONSHIP BETWEEN SHORT DURATION AND 24-HOUR URINARY EXCRETION PATTERN OF SOME NITROGENOUS COMPOUNDS. **S.A. Bhambal, K.S. Sharma and Sheela Bhambal.** *Department of Physiology, M.G.M. Medical College, Indore.*

RELEASE OF PROSTAGLANDIN ON NERVOUS STIMULATION OF FROG'S STOMACH MUSCLE AND URINARY BLADDER. **Sunita I. Singh, Inderjit Singh and Amarjit Singh.** *Department of Physiology, Maulana Azad Medical College, New Delhi.*

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THERAPEUTIC EFFECTIVENESS OF FRACTION 'A' OF COMMIPHORA MUKUL (EXPERIENCE OF CLINICAL USE UPTO ONE YEAR). **S.C. Malhotra, V.K. Sehgal and M.M.S. Ahuja.** *Department of Medicine, All India Institute of Medical Sciences, New Delhi.* (1971)

INVESTIGATIONS ON THE FRUIT OF WITHANIA COAGULANS, DUNAL. **R.D. Budhiraja, K.N. Garg and N.C. Chaudhary.** *Department of Pharmacology and Pharmacy, Medical College, Rohtak.*

EFFECT OF LOW POTASSIUM CONTAINING SOLUTIONS ON SMOOTH MUSCLE CONTRACTILITY. **Deepak Bose.** *Department of Pharmacology and Therapeutics, University of Manitoba, Winnipeg 3, Manitoba, Canada.*

FURTHER STUDIES ON THE ANTI-INFLAMMATORY ACTIVITIES OF CROTALABURNINE. **Hardyal Singh and M.N. Ghosh.** *Department of Pharmacology, Government Medical College, Patiala and J.I.P.M.E.R., Pondicherry-6.*

ANTI-INFLAMMATORY AND ANTI-ARTHRITIC ACTIVITY OF AN INDIAN MEDICINAL PLANT—VANDAROXBURGHII. **S.K. Bhattacharya, R.S. Rathor, R. Chakraborty and P.K. Das.** *Department of Pharmacology, Institute of Medical Sciences, Banaras Hindu University, Varanasi-5.*

PHARMACOLOGICAL ASPECTS OF A NEW ANTHELMINTIC TETRAMISOLE. **S.S. Mahajani and B.B. Gaitonde.** *Department of Pharmacology, Grant Medical College, Bombay.*

ANTI-INFLAMMATORY AND ANTI-HYALURONIDASE ACTIVITY OF VOLATILE OIL OF CURCUMA LONGA (HALDI). **S.S. Gupta, Dinesh Chandra and N. Mishra.** *Department of Pharmacology, Gandhi Medical College, Bhopal.*

EFFECTS OF SHORTWAVE ULTRAVIOLET IRRADIATION ON PSORALEN IN PRESENCE OF SULPHYDRYL GROUPS. **Ahmad Safi Ansari and Rashid Ali.** *Department of Biochemistry, J.N. Medical College, Aligarh Muslim University, Aligarh.*

A MODIFIED HYDRINDANTIN CONCENTRATION FOR NINHYDRIN REAGENT. **Ahmad Safi Ansari and Rashid Ali.** *Department of Biochemistry, J.N. Medical College, Aligarh Muslim University, Aligarh.*

A SCHEME FOR DETECTING ALKALOIDS. **Y.S. Naik and K.V. Chimote.** *Department of Pharmacology, Medical College, Aurangabad.*

STUDIES ON CEREBRAL METABOLISM IN COLD ENVIRONMENT. **S.D. Bhardwaj, M. L. Gupta, S. Sharma and P. Vyas.** *Upgraded Department of Physiology and Biochemistry, S.M.S. Medical College, Jaipur.*

EFFECT OF EMOTIONAL STRESS ON BLOOD LACTIC ACID IN HUMAN BEINGS PRE-EXAMINATION TENSION. **Sarla Sharda, Som Lata Gupta and K.P. Khuteta.** *Department of Physiology and Biochemistry, S.M.S. Medical College, Jaipur.*

EFFECT OF HYPOTHERMIA ON BLOOD GLUCOSE SERUM INSULIN IN DOGS. **S. L. Mali and K. P. Khuteta.** *Department of Physiology and Biochemistry, S.M.S. Medical College, Jaipur.*

CATECHOLAMINES AND STRESS INDUCED CHANGES OF MYOCARDIAL GLYCOGEN AND BLOOD GLUCOSE CONCENTRATIONS IN RATS. **V.N. Sharma, V. Singh and S. Prabhu.** *Department of Pharmacology, S.M.S. Medical College, Jaipur.*

BEHAVIOURAL AFTER-EFFECTS OF SIMULATED HIGH ALTITUDE IN RATS. **M.L. Gupta, B.D Gupta, P.C. Dandiya and P.K. Pareek.** *Department of Physiology and Biochemistry, S.M.S. Medical College, Jaipur.*

AN EXAMINATION OF THE AFTER-EFFECTS OF SIMULATED HIGH ALTITUDE ON THE ACQUISITION OF CONDITIONED BEHAVIOUR IN RATS. **B.D. Gupta, M.L. Gupta, P.C. Dandiya and P. K. Pareek.** *Department of Physiology, S.M.S. Medical College, Jaipur.*

STIMULATION OF UPTAKE OF 6-7-³H OESTRADIOL AFTER PRIMING WITH NORETHYNODREL. **Vimla Laumas, A. Farooq and K.R. Laumas.** *Department of Reproductive Biology, All India Institute of Medical Sciences, New Delhi.*

METABOLIC CLEARANCE FROM PLASMA AND TISSUE LOCALIZATION OF PROGESTERONE AFTER A CONSTANT INTRAVENOUS INFUSION OF 6-7-³H PROGESTERONE IN RABBITS. **Urmila Verma and K.R. Laumas.** *Department of Reproductive Biology, All India Institute of Medical Sciences, New Delhi.*

EFFECT OF ORAL CONTRACEPTIVES ON SERUM ISOCITRIC DEHYDROGENASE AND ALDOLASE IN WOMEN. **V.S. Rathor, K.P. Khuteta and M. L. Gupta.** *Department of Physiology, S.M.S. Medical College, Jaipur.*

EFFECT OF COPPER AS AN I.U.D. ON SOME UTERINE ENZYMES IN THE RAT. **S. Chatterjee and K. R. Laumas.** *Department of Reproductive Biology, All India Institute of Medical Sciences, New Delhi-16.*

RELATIONSHIP BETWEEN HYPOTHALAMIC FSH-RF AND PUBERTY IN THE RAT. **S.C. Sud.** *Department of Physiology and Pharmacology, U.P. Agricultural University, Pantnagar-Nainital-U.P.*

A STUDY OF OVULATORY PERIOD IN INDIAN GIRLS. **Sheela Bhatia, H.N. Mehrotra and V.M. Bhatnagar.** *Department of Physiology, G.S.V.M. Medical College, Kanpur.*

ESTIMATION OF SERUM HEAT STABLE AND HEAT LABILE ALKALINE PHOSPHATASE IN NORMAL AND ABNORMAL PREGNANCY. **M. Khan, R.S. Rizvi, S.A. Rizvi and S. Hameed.**

A STATISTICAL METHOD OF EVALUATION OF SPERMATOGENIC INHIBITION. **R. Malathi Amma and K. Madhavan Kutty.** *Department of Physiology, Medical College, Trivandrum.*

FURTHER STUDIES ON B. PERTUSSIS VACCINE AND ANAPLYLACTIC SENSITIZATION. **H. L. Dhar.** *Department of Pharmacology, Seth G.S. Medical College, Bombay.*

EVALUATION OF SOME CARBONIC ANHYDRASE INHIBITORS IN EXPERIMENTAL GLAUCOMA. **K. N. Garg.** *Department of Pharmacology, Medical College, Rohtak.*

SOME OBSERVATIONS ON THE ANTICONVULSANT PROPERTIES OF 1,4-BENZODIAZEPINE DERIVATIVES. **B.P. Mukherjee, S.R. Dasgupta and B.C. Roy.** *Department of Pharmacology, P.G. Institute of Basic Medical Sciences, Calcutta.*

USE OF CATION EXCHANGE RESINS AS ARTIFICIAL LIVER. **J.S. Juggi, I.D. Singh and N.S. Chaudhary.** *Department of Physiology, Medical College, Patiala.*

STUDIES ON HUMAN INTESTINAL OBSTRUCTION (1) EFFECT ON ELECTROPHORETIC PATTERN OF SERUM PROTEINS. **Ramji Lal Gupta, K.N. Bhargava and K.P. Khuteta.** *Department of Physiology and Biochemistry, S.M.S. Medical College, Jaipur.*

RUMEN MOTILITY IN BUFFALOES FOLLOWING INSULIN OR GLUCOSE ADMINISTRATION. **R.V. Singh, S.C. Sud and H.S. Bahga.** *Department of Physiology and Pharmacology, U.P. Agricultural University Pantnagar, Distt. Nainital—U.P.*

PHARMACOKINETICS OF IRON ABSORPTION. **B.B. Gaitonde, B.J. Vakil, M.R. Samuel and Kishore-Dattani.** *Clinical Pharmacology Unit, Grant Medical College and J.J. Group of Hospitals, Bombay.*

EFFECT OF RADIATIONS ON INTESTINE. **S.D. Bhardwaj, M.L. Gupta and I. Shukla.** *Department of Physiology and Biochemistry, S.M.S. Medical College, Jaipur.*

- TRAVENTRICULAR NORADRENALINE ON HYPERGLYCEMIA OCCURRING IN ANESTHETIZED CATS EXPOSED TO ACUTE OPERATIVE PROCEDURES. **S.V. Shaligram and B.B. Gaitonde.** *Department of Pharmacology, Grant Medical College, Bombay.*
- THE INFLUENCE OF AMNIOTIC, ASCITIC FLUIDS AND PLACENTAL EXTRACTS ON THE MITOTIC INDEX AND MITOCHONDRIAL COUNT OF NORMAL AND REGENERATING LIVERS. **A. Namasivayam and V. Padmanabhan.** *Institute of Physiology, Madras Medical College, Madras.*
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