Physiology

FECT OF HYPOTHALAMIC EXTRACTS, VASOPRESSIN AND OTHER IDES ON THYROID ACTIVITY. W.J. Schindler*[1] and G.W. (spon: H.E. Hoff) Dept. Physiol. Baylor Medical Sch., Texas, and Dept. Anat., Oxford Univ., England.
ffect of 2-hr. intravenous infusions of various poly- and hypothalamic extracts on the activity of the gland was studied in 210 rabbits. Stimulation of activity was assessed in the conscious, unrestrained y the acute release into the blood of I^{131}-labeled s from the previously inactive gland. Crude acetic racts of cattle median eminence tissue, TSH and vaso- (synthetic and purified) stimulated thyroidal activity. ine produced an occasional irregular stimulation. ueous extracts of cattle anterior hypothalamic tissue, thioglycollate inactivated vasopressin, oxytocin, glucagon, norepinephrine, ACTH and 3'5' AMP infusions stimulate thyroidal activity. The thyroidal response ressin was indistinguishable from that following TSH ard to latency, peak, duration of response, and quali- elease of inorganic iodide and iodothyronines but not sines from the gland. Vasopressin is active in the ectomized rabbit. These studies indicate that vaso- acts at the thyroid level, perhaps via permeability
[1]Former Fellow Fndn. Fund for Res. in Psychiatry.
ed by grant from U.S. Air Force (AF 61(514)-953).

Physiology

OF ADRENAL STEROIDS ON THYROID AND I-131 DISTRIBUTION
. E. Flamboe* and R. M. Johnson. Colo. State Univ. lins, Colorado.
ous studies indicate elevated levels of cortical hor- hibit the thyroid. The cause has been attributed to xcessive iodide loss in urine or decreased pituitary etion. The present study, in a controlled environment, a significantly greater ($P<0.05$) mean loss of I-131 of 9 bilaterally adrenalectomized goats receiving jections of 75 mg. cortisone, 15 mg. desoxycorticos- cetate/100 lbs/day when compared to 8 intact control This hormone dose was 6 times the minimal maintenance he per cent of injected I-131 dose (PID) appearing in e in 11 hours was 10.06 and 1.93 for experimental and goats respectively. However, plasma I-131 levels in rimental group averaged almost 50% higher than controls cant difference ($P<0.01$). The mean PID accumulated by oids of experimental goats in 24 hours was 16.72 which ficantly lower ($P<0.01$) than the control figure of he mean thyroid secretion rate for steroid treated s lower (0.392 mg. l-thyroxine/100 lbs/day) but not antly different ($P<0.10$) from the control value of hese data for the goat indicate excessive iodide loss eys is not a factor in thyroid inhibition by adrenal . (Supported by a grant from Aerospace Med. Res. Lab., Med. Div., Air Force Systems Comm. U.S.A.F.)

PORT MECHANISMS VI: IONS

Physiology

F OSMOLALITY ON WATER ABSORPTION BY THE GALLBLADDER. itlock*, P. L. Mancusi-Ungaro* and H. O. Wheeler. Univ. Col. of Physicians and Surgeons, New York.
absorption of water through the wall of the rabbit der in vitro is proportional to net solute flux, in-

2762 Physiology

TOTAL OSMOTIC ACTIVITY OF SYNOVIAL FLUID OF THE MAJOR JOINT CAVITIES OF DOGS. W. G. Kubicek, G. R. Sampson,* M.E. Olson*. Dept. of Physical Med. and Rehabilitation, Univ. of Minnesota, Minneapolis, Minn.

Ropes, et. al (J. Clin. Invest. 18:351-372,1939) reported osmotic pressures of the synovial fluid of the astragalo-tibial joints of cattle to be higher than that of the serum by the freezing point determination and postulated that mucin in some manner affected the results. Total osmotic activity of the synovial fluid from hip, elbow, shoulder and knee joints of five mongrel dogs was estimated on a Hill-Baldes thermo-electric osmometer. The total osmotic activity of the arterial blood plasma of each animal was also determined. Two male and three female dogs were used. These animals ranged in estimated ages from five months to five years. They were anesthetized with sodium pento-barbital to permit dissection of the joint capsule and collection of fluid free of blood cells. The table shows the total osmotic activity (milli-equivalents of NaCl/liter) of synovial fluid (S.F.) and arterial plasma.

Plasma	159.1	152.7	157.6	157.6	160.0
S.F. (mean)	171.1	152.0	155.6	151.4	157.5

(Supported in part by OVR Grant No. RT-2)

Fed. Proc. 22 p. 623 (1963)

2763 Abstract No. 4 Physiology

EFFECTS OF OXIDIZING AND REDUCING AGENTS AND A-C CURRENT ON FROG SKIN POTENTIAL. K. D. Straub* and W. S. Lynn, Jr.* (spon: F. L. Engel). Dept. of Biochem., Duke Univ., Durham, N. C.

Various authors (e. g. Lund, Marsh, Conway, and Jahn) have suggested that the development of a transmembrane O-R potential is the first step or at least an associated process in active ion transport. The present studies were done to determine whether oxidizing and reducing agents can alter the membrane potential of frog skin. The ventral skins of grass frogs (Rana Pipiens) were used and membrane potentials described were measured with reversible electrodes. Reducing agents with E_o' lower than -0.5V when added to the inside bathing solution in 10^{-2}M concentration and oxidizing agents with E_o' of greater than +0.4V when added to the outside bathing solutions reduced irreversibly the measured potential by 50% or more in 10 min. Reducing agents added to the outside solution and oxidizing agents added to the inside solution had no effect. A-C current of frequencies below 10,000 cps and with amplitude above 1V peak to peak and of duration of 30 seconds or longer also decreases irreversibly the potential by 50% or more in 10 min. The maximum effect is observed at a frequency of 800 to 1200 cps. These observed decreases in potential may occur by an increase in permeability to sodium, by alteration of transmembrane redox potentials, or by induction of dipoles which disorient membrane charge distribution. (Supported by PHS Grant number GS-105.)

2764 Physiology

CYCLIC AMP AND ACTIVE ELECTROLYTE TRANSPORT. J. B. Harris and D. Alonso.* Univ. of Calif. Sch. of Med., San Francisco.

The greater effectiveness of theophylline (10^{-2}M) over histamine (10^{-4}M) was demonstrated by respective average maximum increases of 11.4 and 8.6 cc/hr/cm² in the spontaneous

2765 Physiology

OXYGEN CONSUMPTION BY THE TOAD BLADDER IN THE ABSENCE OF CALCIUM. R. M. Hays and B. Singer.* Albert Einstein College of Medicine, New York.

Bentley (J. Endocrin. 21: 161, 1960) reported that in the absence of calcium, short-circuit current measured across the toad bladder was significantly reduced. It was suggested that calcium was important in maintaining active Na transport and its response to vasopressin. However, the use of the short-circuit technique in this instance is misleading since, in the absence of calcium, epithelial cells become detached from the bladder. As an initial approach to the measurement of Na transport under these conditions, the oxygen consumption (Q_{O2}) of the bladder was studied. EDTA was used to insure the absence of calcium. When EDTA was added to the Ringer's solution bathing the bladder, Q_{O2} rose significantly above control values. ($\Delta = 0.43 \pm .05$). If sodium was excluded from the bathing medium, EDTA failed to increase Q_{O2}. When a bladder previously incubated in EDTA was stimulated by vasopressin, Q_{O2} was significantly higher than that of non-hormone-treated controls ($\Delta = 0.21 \pm .03$). Vasopressin failed to increase Q_{O2} if sodium was absent. If oxygen consumption reflects the rate of Na transport under these conditions, the toad bladder appears able to maintain Na transport at a high level and to respond to vasopressin in the absence of calcium.
(Supported by Grant A-3858, USPHS)

2766 Physiology

BIOELECTRIC MEASUREMENTS AND ION AND PHOSPHATE CHANGES IN RAT GASTRIC MUCOSA. J. T. Cummins* and B. E. Vaughan. U. S. Naval Radiological Defense Laboratory, San Francisco 24, Calif.

Bioelectric and biochemical studies were performed on rat stomach supported in vitro by methods described previously. Tissues which achieved a potential of 20 mv (mucosa negative) after one hour had a phosphocreatine level of 2.5 μM/g and potassium level of 48 μM/g in the glandular portion. Nitrogen or cyanide poisoning eliminated this potential, and both lowered phosphocreatine to 0.4 μM/g and potassium to 28 μM/g. Short circuit current and power output were also determined. A decrease in phosphocreatine occurred when tissues were continuously taxed to maximum power. Ion substitution in Krebs-Ringer type solutions showed that the normal potential was linearly dependent on sodium concentrations from 0 to 50 m Molar, but not dependent on chloride. However, on replacing sodium completely with choline, a small tissue potential 2 mV was noted, opposite in polarity, and eliminated by nitrogen poisoning. There was no effect of histamine, vasopressin, or aldosterone on the sodium potential when added to both mucosal and serosal sides in vitro. These studies show that the stomach preparation is capable of maintaining phosphocreatine and potassium at levels comparable to those in vivo, and that the potential across the gastric mucosa is controlled by sodium ion.

2767 Physiology

ANOMALOUS VOLUME-OSMOTIC PRESSURE RELATIONSHIPS OF THE HUMAN ERYTHROCYTE IN VITRO AND IN VIVO. Norman Deane.* New York Med. Col., New York.

Mixtures of whole blood (WB) and sucrose solutions (SS) of