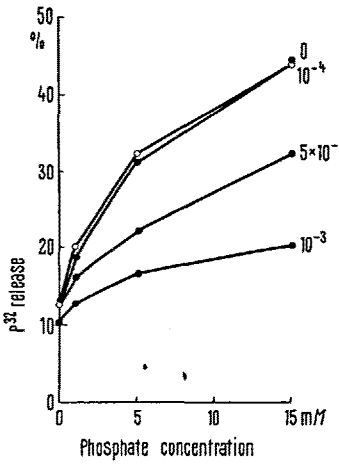
interaction. That is, as cellular P_i is elevated, the P^{32} that is being released continuously from organic phosphate is not re-esterified as rapidly because of the increased probability that non-radioactive P_i would enter into the esterification reactions. This leads to greater P^{32} availability for release. Cellular P^{32} has been found to be increased as a function of cellular P_i under these conditions[3]. Moreover, there appeared to be no change in anion permeability in these studies[3].



DNP inhibition of P^{32} release from human red cells as a function of medium phosphate concentration.

The results of this study indicate that DNP does inhibit P^{32} release and that this effect can be greatly magnified by the simple expedient of suspending the labeled cells in high P_i media. Both sulfate[1] and phosphate release from human red cells thus appear to be inhibited by the same concentration of DNP, indicating that the mechanism involved may be the same for the 2 anions. Current thought[4,5] appears to favor a passive mechanism such as simple diffusion or an equilibrating carrier mechanism with a high K_m[6].

Zusammenfassung. Inkubiert man P^{32}-vorbeladene menschliche Erythrozyten unter Zusatz von $5 \times 10^{-4} M$ Dinitrophenol, so lässt sich eine Reduktion der Phosphatabgabe feststellen. Mit Erhöhung des extrazellulären Orthophosphatgehalts kann diese Wirkung besser gesehen werden.

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Superior Cervical Ganglionectomy in the Japanese Quail

The ability of light to act as a 'Zeitgeber' (synchronizer) for the circadian rhythm of ovulation-oviposition in birds is well known[1-3] and also its role as a stimulator for the growth and development of avian gonadal tissue[4-6]. In recent years, a great deal of attention has been focused on the function of the pineal gland as a possible participant in light-induced neural mechanisms. The mass[7,8], morphology[9], serotonin content[10], melotonin content[11,12], and HIOMT[13-15] can be altered by varying the amount of light to which the animal is exposed. In the rat, constant exposure to light decreases the weight of the pineal gland, reduces the size of the pinealocyte and its nucleoli, and the level of cytoplasmic basophilia. The content of serotonin is nine times greater during the light phase than during the dark phase, and HIOMT is inhibited by light.

In chickens diurnal or constant light causes an increase in the size of the pineal gland as well as in the HIOMT activity of the pineal[15]. Pinealectomy in the chicken caused testicular atrophy in the coung cockerel[16] but testicular hypertrophy in older cockerels[17]. Pinealectomy in the Japanese quail permitted rapid oviducal growth in the female exposed to diurnal photoperiods but was without effect in quail kept under non-stimulatory photoperiods. Melatonin implantation in low concentrations inhibited gonadal growth, whereas higher concentrations changed the time of lay but did not interfere with ovarian activity[18].

Since it had been shown in the rat that light influenced the pineal by way of the superior cervical ganglion[19], it

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was of interest to determine whether or not the superior cervical ganglion of birds influences the reproductive processes.

Method. To explore this, a series of sexually mature male and immature and laying female quail were subjected first to unilateral superior cervical ganglionectomy and then to bilateral ganglionectomy 2–3 weeks later. The superior cervical ganglion of the Japanese quail is located adjacent to the base of the skull between the tenth and eleventh cranial nerves. Surgery was performed under sodium pentobarbital anesthesia. A marked ipsolateral ptosis of the eyelid developed immediately following surgery. This had been observed also in rats subjected to ganglionectomy but was shown not to be a contributing factor in so far as HIOMT activity was concerned[19].

Results and discussion. Neither unilateral superior cervical ganglionectomy nor bilateral ganglionectomy of males of various ages affected either testicular or cloacal gland activity. This is in contrast to the findings in chickens[16,17].

However, bilateral ganglionectomy did interfere with egg production in laying quail (Table I). The average egg production over a 2 week period was interfered with decidedly. Following bilateral ganglionectomy, the quail laid few eggs, paused in egg production for varying lengths of time, and then resumed egg production to regain their preoperative level within approximately 2 or 3 weeks. The pause in egg production was significantly different between both controls and unilaterally ganglionectomized quail and the bilaterally ganglionectomized quail. It was obvious that the removal of the superior cervical ganglion from adult quail inhibited the female reproductive tract; however, this inhibition was not permanent.

Bilateral ganglionectomy in 3-week-old immature female quail resulted in a delay in the onset of egg production; however, somatic growth was not affected (Table II).

Quail subjected to bilateral ganglionectomy showed a lessened resistance to environmental stresses in contrast to the intact quail (Table III). When sexes were maintained in a favorable temperature under either 14 h light/10 h dark or constant light, mortality was low in both controls and ganglionectomized quail. However, when females were maintained at the same temperature but their photoperiod was changed to 8 h light/16 h dark, or when males were maintained under constant light but subjected to cooler temperatures, the mortality of the ganglionectomized quail increased markedly in relation to controls. At the present time we have no explanation why this increased mortality should occur.

We conclude from the data that the pineal gland is involved in some of the light-mediated processes in Japanese quail but that more information is needed to ascribe a specific role[20].

Table I. Effect of ganglionectomy on egg laying in Japanese quail

Group (No.)	No. of eggs produced during 2 weeks after surgery	Days pause in egg production (days observed) after surgery
Preoperative controls (11)	12.1 ± 0.5[a]	1.5 ± 0.5 (14)
Unilateral ganglionectomy (11)	11.8 ± 0.3	2.2 ± 0.4 (14)
Bilateral ganglionectomy (11)	5.3 ± 0.8[b]	13.2 ± 3.7[b] (45)

[a] Mean ± S.E.M. [b] $P < 0.01$.

Table II. Effect of bilateral ganglionectomy on somatic growth and onset of egg production in Japanese quail

Group	Body weight, g			Age in days at onset of egg production
	3 weeks (time of operation)	7 weeks	10 weeks	
Control	76.5 ± 1.9 (7)[a]	128.0 ± 3.4 (6)	138.5 ± 4.2 (6)	58.8 ± 4.2 (6)
Bilateral ganglionectomy	76.6 ± 1.8 (7)	132.0 ± 3.8 (7)	145.0 ± 8.2 (7)	71.1 ± 2.6 (7)[b]

[a] Mean ± S.E.M. No. of animals in parentheses. [b] $P < 0.05$, at 11 weeks of age 2 birds were still out of lay.

Table III. Mortality of Japanese quail following bilateral ganglionectomy and subsequent exposure to environmental stresses

Sex	Environment		Mortality[a]		Experimental period (days)
	Temperature (°C)	Photoperiod h light:dark	Ganglionectomized	Control	
Female	20–25	14L:10D	0/7	0/7	14 days
Male	20–25	24LL	0/13	2/30	28 days
Combined			0/20	2/37	
Female	20–25	8L:16D[b]	9/14	2/14	3 days
Male	10–15[b]	24LL	10/13	5/28	3 days
Combined			19/27	7/42	

[a] No. of deaths during observation period/No. of total birds at the start. [b] Environmental stress.

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Résumé. Les effets de l'ablation des ganglions cervicals supérieurs de *Coturnix coturnix japonica* font l'objet de cet exposé. Chez le mâle la gangliectomie bilatérale n'affecte pas l'activité testiculaire. Par contre chez les femelles la quantité d'œufs pondus est nettement réduite et l'interruption post-opératoire de la pondaison est prolongée; de plus la première ponte des jeunes femelles est retardée. Les *Coturnix* qui ont subi l'ablation des ganglions ont un taux de mortalité plus élevé lorsque les oiseaux sont exposés à des abaissements de température et des changements de photopériodisme.

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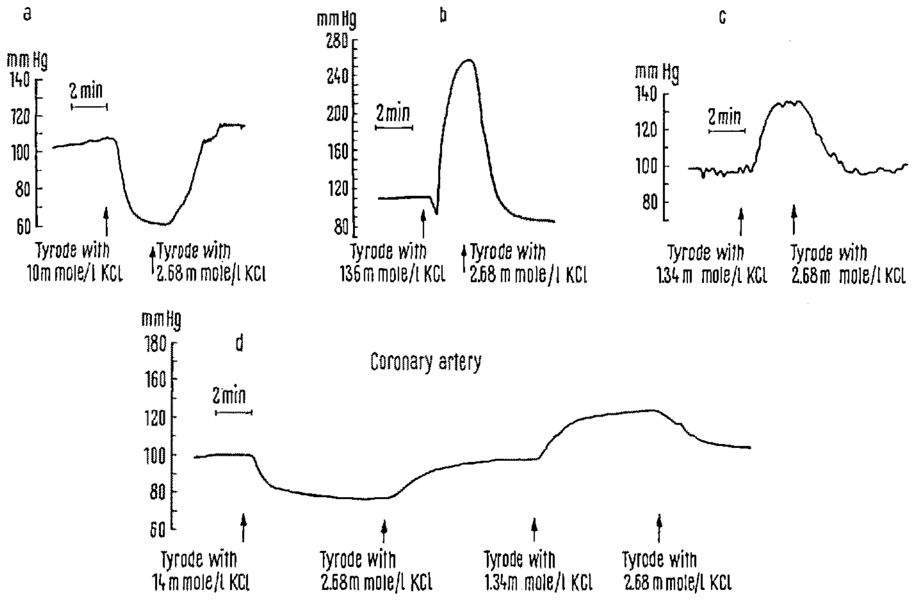
The Mechanical Response of Isolated Arteries to Potassium

Some studies during the past years have indicated that potassium ions play an essential role as regulators of vascular tone[1-7]. Potassium is released in sufficient amount by exercising muscles and its concentration is immediately increased in the venous blood[4-12]. The effect and extent of vasodilatation induced by intra-arterial infusions of potassium is strikingly similar to that of exercising muscles[4]. These data were obtained on limb preparations and the effect of potassium was proved from the lumen of the arteries.

The question arises whether and how potassium acts if applied from the outside of the arteries, for there is some indication that potassium released during muscular exercise influences vascular tone from the outside of the arteries or rather from the interstitial space. The present studies have been carried out in order to provide quantitative information about the influence of potassium acting from the outside of the vessels.

Method. Isolated bovine facial and coronary arteries of 30–40 mm length were stored in defibrinated and oxygenated blood at a temperature of 4 °C. The arteries were prepared in Tyrode solution 1 h before testing. The adventitia was removed and the small vessels ligated. They were mounted in a chamber with a constant temperature of 37 °C and placed together with Tyrode solution under different pressures (50–120 mm Hg). One end of the artery was closed, the other connected by means of a fine tube with a pressure transducer (Fa. Schwarzer, Munich, Germany). The arteries were rinsed from the outside with various solutions at a temperature equal to that of the chamber. The Tyrode solution had the usual composition except that glucose had been added. The solutions were aerated with 95% oxygen and 5% carbon dioxide. The potassium content was increased or decreased by replacing NaCl with KCl on an equimolar



The effects of variations of the potassium concentration on vascular tone in the facial artery (a–c) and coronary artery (d, e), measured by inside pressure in mm Hg. The normal potassium concentration in the Tyrode solution is 2.68 mmole/l. Arrows indicate the change of the various solutions. (a) Increase in the K$^+$ concentration to 10 mmole/l; (b) increase in the K$^+$ concentration to 136 mmole/l; (c) decrease in the K$^+$ concentration to 1.34 mmole/l; (d) increase in the K$^+$ concentration to 14 mmole/l; (e) decrease in the K$^+$ concentration to 1.34 mmole/l.

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