sleep – constant amplitude, high frequency θ-waves. The record for each mouse was analyzed into all 3 categories and the overall percentage of each was obtained. The Table shows the mean and standard deviation for the percentages of slow wave sleep and REM, and the percentage REM of total sleep time for both groups. Mann Whitney U-tests were carried out on the data for the percentage of REM (significant at 0.05 level, one-tailed test) and for the percentage REM of total sleep time (significant at 0.01 level, one-tailed test), showing significant increases in both measures for the group treated with nicotinamide. Comparisons between the percentage of REM for the first 300 pages of EEG record and the percentage of REM for the last 300 pages were not significant for either group, indicating that the increase seen after nicotinamide was present for the full 10 h period. We have confirmed these results in a second experiment using inbred C57 mice. All showed a 25%, or more, increase in percentage REM. Further experiments are being conducted with this strain.

Discussion. Much controversy surrounds the use of niacin in the treatment of schizophrenia. LIPTON[7] allows that there may be a small subgroup of schizophrenics who do respond to niacin balanced by an equal number who get worse (see further SMYTHIES[8]). Schizophrenia is clearly a heterogenous syndrome with probably many different biochemical lesions involved in different subgroups. HOFFER[9] began treating patients with nicotinic acid because of its alleged role as a methyl acceptor. It should therefore, theoretically, lower the levels of the available methyl groups which may be contributing to the illness via a transmethylated psychotoxin. HOFFER et al.[9] have repeatedly reported the effectiveness of nicotinic acid in treating schizophrenics; however, many other investigators have failed to do so (these studies are reviewed by WYATT et al.[10]). It has not been shown that nicotinic acid can reverse the exacerbations observed in schizophrenics after the administration of methionine[11], nor is there any reported evidence that it impairs the methylation capacity of the body. Furthermore BALDESSARINI[12] reports that nicotinamide is not a good methyl group acceptor in the rat and does not lower levels of S-adenosyl methionine.

The results of this study show that high doses of nicotinamide may have behavioral effects unconnected with its role as a vitamin. The best known drug that increases REM is reserpine[13]. This suggests that a further pharmacological study of nicotinamide in this light might be of interest.

Résumé. Après avoir reçu pendant 21 jours une injection quotidienne de 250 mg/kg nicotinamide, des souris ont été examinées chroniquement par l'EEG. La nicotinamide prolonge la phase de sommeil et fait augmenter les mouvements oculaires.

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Beta-Adrenergic Dilatory Responses in Isolated, Saline Perfused Arteries of an Elasmobranch Fish, *Squalus acanthias*

Adrenergic receptors have been shown to mediate vasodilation in isolated saline perfused gills of teleosts[1] and elasmobranchs[2]. The sites of adrenergic vasodilation can not be localized in isolated perfused gills and the possibility exists that both shunts within the gill vasculature[3] and tonal changes in the arteries, afferent and efferent to them, contribute to the regulation of branchial circulation. KIRBY and BURNSTOCK[4] were unable to demonstrate any inhibitory responses in lower vertebrate arterial strip preparation including teleost ventral aortae. This communication reports inhibitory reponses to catecholamines in the ventral aorta and afferent branchial arteries of the dogfish, *Squalus acanthias*.

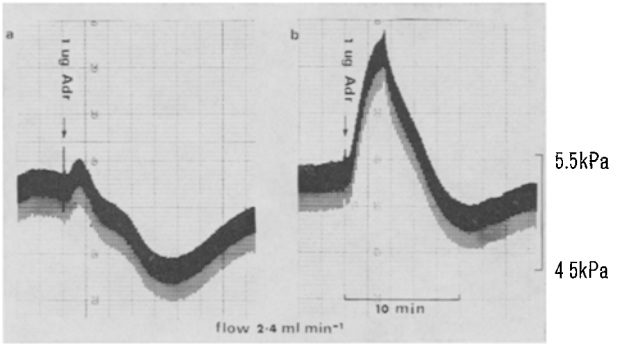

Fig. 1. a) The biphasic response to 1 µg adrenaline in a perfused 1st afferent branchial artery of *Squalus acanthias*. b) The response to 1 µg adrenaline 20 min after the administration of 100 µg of propranolol; the α-component of the biphasic response has been potentiated and the β-component diminished. Ordinate: pressure in kilopascals.

Segments of prebranchial arteries were cannulated in situ in freshly pithed dogfish (1–2 kg); then excized and perfused with an elasmobranch ringer at 10 °C. The ventral aorta and 1–2 cm segments of the 1st (hyoidean), 2nd and 3rd afferent branchial arteries were used. Ventral aortae were cannulated anterior to the conus arteriosus and all the afferent arteries were tied off except an innominate

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which was cut to permit outflow of perfusate. Arteries were perfused with a Harvard peristaltic pump at constant flow rate (2-8 ml/min); perfusion pressure was monitored (Statham P23Dc pressure transducer) and recorded on paper (Servogor S). Drugs were delivered by bolus injection (10–100 µl) into an injection cuff in the perfusion line. Injection of adrenaline and noradrenaline (10^{-5}–10^{-8} g) produced a biphasic response of an initial vasoconstriction followed by a longer period of vasodilation (Figure a); isoprenaline produced only vasodilation. The β-blocker, propranolol hydrochloride potentiated the constrictor phase and diminished the dilator phase (Figure b). Isoprenaline given after propranolol had no constrictor effect but produced a diminished dilator response. Phentolamine mesylate diminished the enhanced constrictor response following propranolol. All arteries examined were qualitatively similar in response. Spontaneous activity and the frequent increase in tone in these preparations has to date precluded quantifying the response to catecholamines.

These results demonstrate that catecholamines can mediate inhibitory effects on the aorta and afferent branchial arteries supplying blood to the gills of the elasmobranch fish *Squalus acanthias*.

Zusammenfassung. Nachweis, dass Catecholamine hemmende Wirkungen auf die Aorta und die afferenten branchialen Arterien, welche die Kiemen des Knorpelfisches *Squalus acanthias* mit Blut versorgen, vermitteln.

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Interaction Between 6-Hydroxydopamine and Rhodopsin in vivo in the Rat Retina

Since dopamine has been suggested to be an inhibitory neurotransmitter in the retina[1,2] and since 6-hydroxydopamine (6-OH-DA) has been widely used recently to study the functions of adrenergic neurons[3], it was considered appropriate to use 6-OH-DA to test the functional effects of dopaminergic retinal neurons. The mechanism of action of 6-OH-DA in inducing the degeneration of adrenergic nerve terminals is still uncertain. WAGNER[4] reported that 6-OH-DA uncouples phosphorylation from electron transport similar to the classical uncoupler, 2,4-dinitrophenol, and suggested that this property of 6-OH-DA may be the first step in initiating the degeneration. 6-OH-DA is readily auto-oxidized resulting in the

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Effects of drugs on retinal sensitivities and rhodopsin contents

Compound	Dose (µmole/eye)	Sensitivity (N.D.No.)	*N*	Rhodopsin[a] (%)	*N*
Saline	—	4.75 ± 0.08	18	100.0 ± 7.1	16
6-Hydroxydopamine · HBr	0.26	4.76 ± 0.12	12	99.5 ± 15.5	4
	0.51	2.28 ± 0.32	10	43.3 ± 13.3	4
	1.0[b]	0.43 ± 0.16	19	13.8 ± 3.8	4
6-Hydroxydopamine · HBr	1.0				
+ $Na_2S_2O_5$	0.26	0.55 ± 0.36	6	27.6 ± 8.5	6
	0.51	2.65 ± 0.41	3	72.5 ± 9.1	4
	1.0[b]	3.45 ± 0.32	6	85.4 ± 8.2	6
$Na_2S_2O_5$	0.26	4.47 ± 0.15	4	90.9 ± 1.8	3
	0.51	3.88 ± 0.11	4	101.2 ± 4.5	3
	1.0[b]	3.24 ± 0.16	6	100.3 ± 11.0	4
2,4-Dinitrophenol[c]	2.0	3.90 ± 0.06	8	—	
	4.0	3.85 ± 0.04	6	—	
0.5 *M Tris*-HCl buffer, pH 9.5	—	4.12 ± 0.06	6	100.0 ± 4.7	6
H_2O_2	4.0	3.47 ± 0.14	11	—	
6-Aminodopamine · 2HCl	0.26	2.00 ± 0.08	5	51.0 ± 2.6	5
	0.51	1.06 ± 0.12	5	35.8 ± 7.1	5
	1.0	0.11 ± 0.06	8	14.3 ± 2.1	7
p-Quinone · HBr of 6-hydroxydopamine	1.0	0.75 ± 0.32	6	27.5 ± 2.9	6
p-Chloromercuribenzoate, Na[c]	1.0	0.18 ± 0.11	5	24.2 ± 7.8	5

Light-adapted rats were anesthetized with ether, injected intravitreously with 10 µl of solvents or drug solutions, and subsequently dark adapted for 4–6 h before the sensitivity and rhodopsin content were measured as described [15]. Sensitivity was expressed as the Kodak neutral density filter number (N.D.No.) placed in the stimulus light path. Rhodopsin content of dark-adapted, saline-injected control served as 100%.
[a] Mean ± S.E. [b] Data from PONG and GRAHAM [15]. [c] In 0.5 *M Tris*-HCl buffer, pH 9.5.