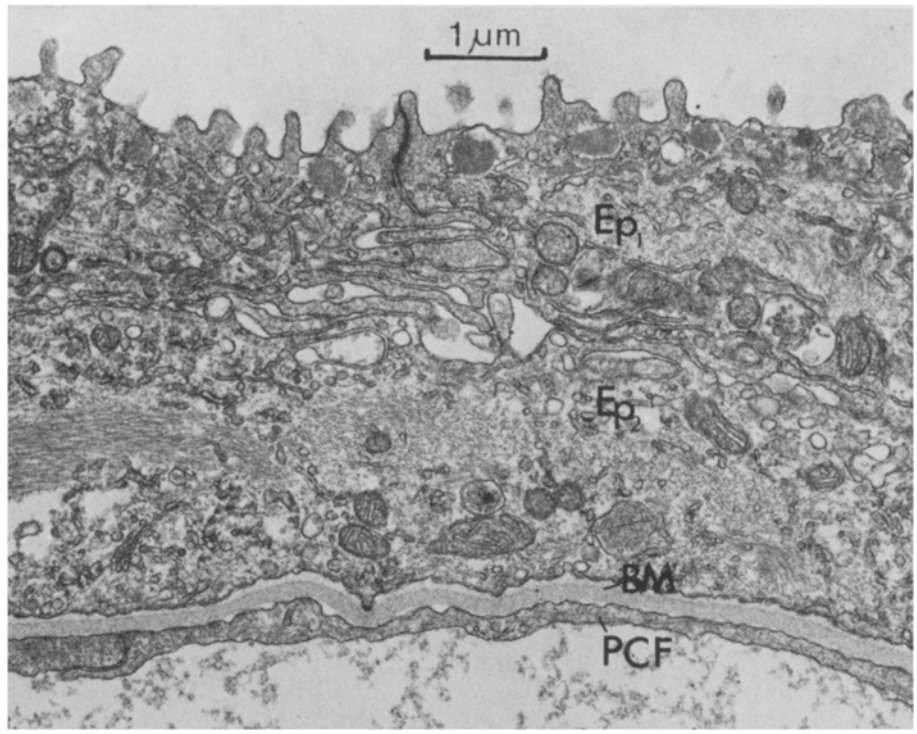

Fig. 3. *Latimeria*. Electronmicrograph of the water/blood barrier of a secondary lamella. (Facilities kindly provided by Professor Weibel, Bern). Ep_1, Ep_2, outer and inner epithelial layers; BM, basement membrane; PCF, pillar cell flange.

other groups of fishes[3–7] (Figure 3). The water/blood barrier consists of two epithelial layers, a relatively thin basement membrane, and a pillar cell flange layer. The pillar cells have fairly stout collagenous columns numbering from 4–6. Thick columns have also been found for tuna pillar cells[6] so that this cannot be associated with the benthic habits of *Latimeria*. The outer surface of the outer epithelial layer has many microvilli beneath which are found vesicles similar to those found in elasmobranchs[5] and *Neoceratodus*[9].

It is concluded that the gills of *Latimeria* retain a primitive organisation and their poor development, together with a low O_2 carrying capacity of the blood[10], suggest a fairly sluggish mode of life. The presence of 4 fully developed gills and a hyoidean hemibranch contrasts with the 3 holobranchs of sluggish benthic teleosts such as toadfish[7] (*Opsanus tau*) and angler fish (*Lophius piscatorius*), and further confirms the primitive construction of the arches in *Latimeria*.

Zusammenfassung. Nachweis, dass die Kiemen von *Latimeria* einen Primitivzustand mit gut entwickelten Interbranchial-Septen aufweisen. Die Gesamtlänge der Filamente ist relativ kurz, doch ähnlich derjenigen von Tiefseefischen. Die Gesamtfläche der Kiemen ist auffallend klein im Verhältnis zum Körpergewicht. Die Sekundärlamellen weisen in ihrer Ultrastruktur gewisse Ähnlichkeiten zu Elasmobranchien auf.

G. M. HUGHES[11]
Research Unit for Comparative Animal Respiration, The University, Woodland Road, Bristol BS8 1UG (U.K.), 14 June 1972.

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Erythrocyte Cation Concentrations and Changes in Dietary Electrolyte Intake

As part of the effort to understand the biology of affective disorders (depression and mania), attention has been focused on possible alterations in electrolyte metabolism[1,2]. This interest is a result of the involvement of electrolytes in the conduction of electrical impulses as well as their role in the reuptake and storage of putative central nervous system transmitter substances.

We have been measuring intra-erythrocyte (RBC) electrolyte values in patients as an index of tissue electrolyte concentrations[3]. It was thought necessary to determine whether variations in dietary electrolyte intake would produce significant changes in RBC electrolyte concentrations, as our patients show marked alterations in their daily dietary intake.

The effect of varying electrolyte intake on plasma and erythrocyte Na, K and Mg

Subject	Diet	Na			K			Mg	
		Plasma (mEq/l)	RBC (mEq/l)	Urine (mEq/day)	Plasma (mEq/l)	RBC (mEq/day)	Urine (mEq/day)	Plasma (mEq/l)	RBC (mEq/l)
R.P.	Ad libitum	133 ± 0.6[a]	6.7 ± 0.15	—	4.7 ± 0.03	99 ± 1.3	—	1.57 ± 0.021	3.29 ± 0.148
	Low[b]	132 ± 0.3	6.7 ± 0.49	36 ± 7.7	4.5 ± 0.15	99 ± 1.2	38 ± 4.5	1.64 ± 0.028	3.44 ± 0.419
	High[b]	133 ± 0.6	6.6 ± 0.02	161 ± 7.7	4.6 ± 0.06	99 ± 0.4	76 ± 2.3	1.52 ± 0.015	3.75 ± 0.090
J.M.	Ad libitum	133 ± 1.0	4.7 ± 0.45	—	3.8 ± 0.06	99 ± 0.5	—	1.43 ± 0.027	3.15 ± 0.229
	Low	132 ± 0.0	6.2 ± 0.07	24 ± 3.7	3.8 ± 0.09	95 ± 1.0	30 ± 2.0	1.55 ± 0.021	3.78 ± 0.147
	High	132 ± 1.0	6.9 ± 0.45	168 ± 21.2	4.7 ± 0.32	94 ± 1.1	68 ± 4.2	1.47 ± 0.047	2.98 ± 0.173
O.M.	Ad libitum	135 ± 1.2	5.6 ± 0.31	—	4.2 ± 0.26	96 ± 0.9	—	1.35 ± 0.014	4.78 ± 0.060
	Low	133 ± 0.3	6.0 ± 0.37	14 ± 1.8	4.0 ± 0.17	96 ± 1.0	19 ± 1.8	1.56 ± 0.023	4.68 ± 0.120
	High	136 ± 0.7	6.8 ± 0.21	150 ± 9.4	4.6 ± 0.06	95 ± 0.8	55 ± 4.0	1.39 ± 0.055	4.77 ± 0.076
J.D.	Ad libitum	136 ± 1.2	7.5 ± 0.42	—	4.4 ± 0.26	97 ± 1.0	—	1.59 ± 0.040	4.83 ± 0.049
	Low	139 ± 0.7	8.0 ± 0.20	15 ± 2.7	3.9 ± 0.09	93 ± 1.1	31 ± 4.2	1.48 ± 0.006	5.53 ± 0.103
	High	136 ± 1.4	7.7 ± 0.65	161 ± 19.0	4.4 ± 0.09	93 ± 1.4	57 ± 4.4	1.44 ± 0.021	4.94 ± 0.196

[a] $\bar{X} \pm$ S.E.M.; each mean value is average of measures on three consecutive days. [b] The content of each diet is listed in *Materials and methods*.

Methods and materials. The 4 male subjects studied (ages 41 to 62 years) had no renal, hepatic or cardiac illness nor overt psychiatric disturbance. For 7 days the hospitalized subjects were not restricted in their dietary intake, with the exception of alcholic beverages. Following this ad libitum eating period, the subjects were assigned a diet of either a low or high electrolyte content for 7 days. The electrolyte content of each diet had the following ion composition: 'low' diet – Na 15–25 mEq/day, K 32–40 mEq/day, Mg 10–12 mEq/day and 1500 calories; 'high' diet – Na 150–165 mEq/day, K 105–115 mEq/day, Mg 60–72 mEq/day and 4000 calories. Plasma and urinary Na and K were determined by flame photometry. Plasma Mg and RBC Na, K and Mg were measured by atomic absorption spectroscopy[4].

Results. The results of days 5 through 7 of each diet were chosen for analysis (Table 1) as there was a definite lag in the renal excretion of sodium with the shift from the 'low' to the 'high' diet, and a delay in the renal conservation of sodium with the change from the 'high' to 'low' sodium intake. Differences among the mean values obtained for the ad libitum, 'low', and 'high' electrolyte periods were evaluated by paired *t*-tests[5] with the following results: 1. the daily urinary excretion of Na and K was significantly greater during 'high' intake than during the 'low' intake period ($p < 0.001$ and $p < 0.005$, respectively); 2. plasma Mg concentration was significantly lower during the 'high' intake period than during the 'low' period ($p < 0.05$); 3. plasma concentrations of Na and K during the 'high' intake period did not differ significantly from plasma Na and K levels during the 'low' intake period; 4. RBC Na, K or Mg concentrations during the 'high' and the 'low' intake period did not differ significantly; 5. plasma and RBC Na, K and Mg concentrations during the ad libitum period did not differ significantly from concentrations observed during either the 'low' or the 'high' cation intake periods.

Discussion. On the average, subjects on the 'high' diet excreted 8 times the amount of Na and twice the amount of K as when on the 'low' diet. Plasma Na and K did not alter with shifts in electrolyte intake. Thus, these data confirm that of other investigators[6,7] showing that plasma solute (particularly Na) concentration does not change with variations in solute intake but that there is an alteration in the renal excretion of water[8]. This report extends these observations made on plasma ion concentrations by demonstrating that major alterations in Na, K and Mg intake do not affect their RBC concentration either. This result implies that changes observed in RBC electrolytes in patients with affective illness and proper renal function[3] cannot be explained by changes in their electrolyte intake. Also, although there may be instances when dietary control is mandatory, it must be remembered that altering experimental conditions such as diet in order to control for one variable, e.g. electrolyte intake, may produce undesirable changes which could influence the experiment[9].

Résumé. Les taux de Na, K et Mg dans les érythrocytes de 4 hommes sont restés constants lorsque les sujets prenaient des diètes avec des quantités très différentes de cas cathions. Ce résultat indique que dans l'érythrocyte les concentrations de ces ions ne sont pas modifiées par des variations très marquées de la quantité des électrolytes ingestés.

A. Frazer, R. G. Fitzgerald, J. Mendels[10]

Departments of Psychiatry and Pharmacology, University of Pennsylvania, and Affective Diseases Research Unit, Veterans Administration Hospital, Philadelphia (Pennsylvania 19104, USA), 9 May 1972.

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