second measurement of the flow rate. Distilled, deionized water was treated by ultrasound of 1 W/cm² intensity, frequency 800 kc. Using an irradiation time of 60 sec, the differences in temperature did not exceed $\pm 1°C$, pH ± 0.2. There was also no change of electrical conductivity observed.

The summary of results (Table) indicates a significant increase in permeability of membranes perfused with irradiated water ($P < 0.01$). Unambiguous results, obtained by using deionized water, were not so conspicuous with simple distilled water, especially when irradiated saline solution was used. The oxidizing effect of peroxides on the colloid properties of the connective tissue offers a possible explanation for our findings.

Zusammenfassung. Die Durchlässigkeit des Rattenmesenteriums für demineralisiertes Wasser wird durch Ultraschallbehandlung des Wassers signifikant erhöht.

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Electrolyte Exchange in Regenerating *Dugesia dorotocephala*

The axial polarity of regenerating planarians (*Dugesia dorotocephala* and *D. tigrina*) may be completely controlled by an applied electrical potential gradient[1-3]. Furthermore, the magnitude of the imposed gradient determines the nature of the morphogenetic response. Elucidation of mechanisms involved in this phenomenon requires data pertinent to the electrical resistance of the regenerants. The behavior of the internal electrolyte concentration as a function of the external concentration is theoretically one such important factor.

Electrolyte exchange with the environment was measured by the changes in specific resistance of aqueous media which contained 25 regenerating sections of *D. dorotocephala*. These sections were cut from 5 intact animals, the extreme anterior and posterior pieces being discarded; the sections were washed and transferred to 25 cm³ of medium. Parallel groups of 5 intact animals of equal size served as references and controls. All animals were starved 5 days prior to use. Specific resistances of the media were determined with an A.C. Wheatstone bridge employing an oscilloscope as a null detector and a conventional conductance cell maintained at $23 \pm 0.2°C$ by a water bath. The 8 media were comprised of mixtures of aerated tap water with Ringer's solution or distilled water and ranged from 103.89 to 9616.8 ohm-cm specific resistance. Duplicate 5 cm³ samples were taken at 24 h intervals over a 5 day period, each group of regenerants or intact animals serving for only one measurement. For simplicity, the specific resistances were calculated and expressed as equivalent concentrations of KCl after correction for evaporative loss. The values reported here are the averages of 6 measurements except for the 103.89 ohm-cm medium, which sharply decreased viability.

Figures 1 and 2 show the changes in electrolyte content of the media as a function of time and specific resistance; thus a positive value indicates a loss by the regenerants. The similarity of electrolyte exchange by intact and re-

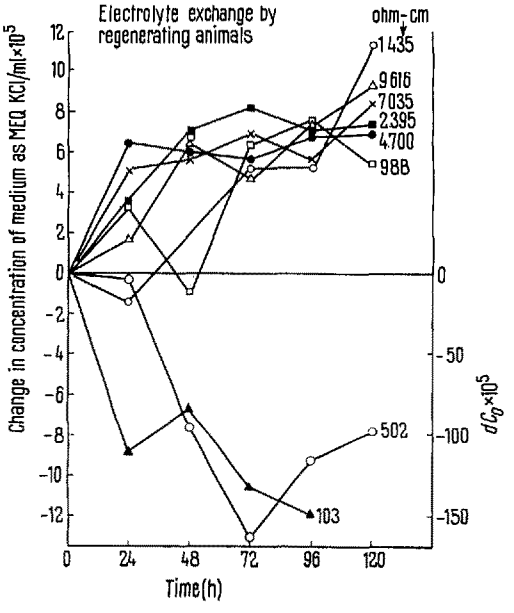

Fig. 1. The change in electrolyte concentration of the medium expressed as MEQ KCl/ml × 10^5 for media of 8 different specific resistances. Values for 103.89 ohm-cm medium are plotted on the right ordinate, all others on the left.

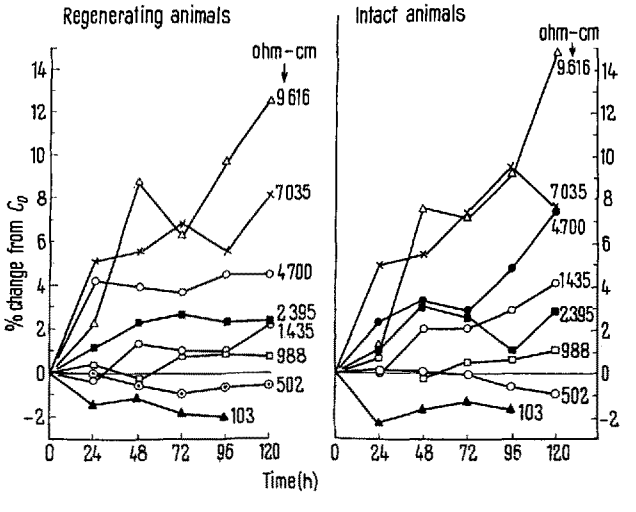

Fig. 2. Electrolyte exchange expressed as % change in the medium concentration from the original.

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generating animals is seen in Figure 2. Attempts to use media of lower concentration (e.g. 11179 ohm-cm) were prevented by drastically increased mortality. At no time were measurements made on groups with any evidence of histolysis.

It appears that the organism attains a state of equilibrium with the medium, the required time varying inversely with the concentration of the medium. Regression analysis, employing the *t*-test, indicates electrolyte loss and external concentration are independent variables at better than the 5% level of significance. The lack of a linear relation between electrolyte exchange and concentration of the medium implicates physiological mechanisms rather than passive ones, in accord with earlier findings[4]. On the basis of the direction and magnitude of the electrolyte exchange, *D. dorotocephala* indicates itself to be in physiological ionic equilibrium with the medium when the latter has a specific resistance of just slightly less than 988.02 ohm-cm.

The fact that regenerating animals attain a state of ionic equilibrium with the external environment implies that the internal resistance remains constant once this state has been reached. Also, it is implied that the internal resistance varies with the specific resistance of the medium, although to a lesser degree (compare with the conclusions of MARSH[3])[5].

Zusammenfassung. Der Elektrolytaustausch von vollständigen und regenerierenden *Dugesia dorotocephala* erweist sich als weitgehend unabhängig von der Konzentration im äusseren Medium. Die regenerierenden Tiere befinden sich in einem physiologischen, ionalen Gleichgewicht, wenn der spezifische Widerstand des Mediums etwas unterhalb 988,02 Ohm-cm liegt.

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[5] *Acknowledgment.* The author is indebted to Prof. G. MARSH for his comments and discussions.

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Influence of the Transport of Amino Acids on Glucose and Sodium Transport Across the Small Intestine of the Albino Rat Incubated *in vitro*[1]

Previous investigations[2-4] have already shown that the absorption of glucose into the epithelial cells of the intestine does not seem to be correlated with the transport of sodium and that, on the contrary, the transport of glucose into the serosal side is closely linked with the transport of sodium.

As in a previous report[4] we shall call the material no longer recovered in the mucosal fluid 'absorbed substance'; the substance appearing in the serosal side will be called 'transferred' or 'transported substance'.

The present paper concerns the behaviour of the transport of the amino acids (L-alanine, L-valine, L-phenylalanine) with reference to the transport of glucose and to the transport of sodium.

Albino male rats (Wistar strain) weighing about 250 g were used. Under barbiturate anaesthesia the small intestine was removed and part of the jejunum about 20 cm

[1] This work has been supported by a research grant of the Consiglio Nazionale delle Ricerche, Roma.

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Incubating mucosal fluid	Na net transfer $\mu E\ g^{-1}\ h^{-1}$	Glucose absorbed $\mu M\ g^{-1}\ h^{-1}$	Glucose transfer $\mu M\ g^{-1}\ h^{-1}$	Amino acid absorbed $\mu M\ g^{-1}\ h^{-1}$	Amino acid transfer $\mu M\ g^{-1}\ h^{-1}$
Na conc. 143.5 mE/l + glucose 13.9 mM/l n = 16	182.0 ± 15.5	145.7 ± 8.4	37.4 ± 3.4		
Na conc. 143.5 mE/l + glucose 13.9 mM/l + L-alanine 20 mM/l n = 12	242.7 ± 23.9	104.6 ± 10.6	29.9 ± 4.6	112.8 ± 11.3	56.1 ± 7.9[a] n = 12 58.1 ± 8.9[b] n = 4
Na conc. 143.5 mE/l + glucose 13.9 mM/l + L-valine 20 mM/l n = 12	252.5 ± 17.2	143.7 ± 15.2	29.0 ± 3.7	61.2 ± 12.5	42.8 ± 2.7[a] 49.2 ± 3.0[b]
Na conc. 143.5 mE/l + glucose 13.9 mM/l + L-phenylalanine 20 mM/l n = 12	307.1 ± 33.4	130.7 ± 12.9	41.6 ± 7.0	135.5 ± 10.5	34.6 ± 4.6[a] 40.7 ± 4.9[b]

[a] = According to the method of MOORE and STEIN[8]. [b] = According to the chromatographic method[9]. The number of experiments (n) and the mean values ± S.E., referred to 1 g fresh weight and 1 h, are reported.