mental investigations in an endeavour to solve this problem are being carried out in our laboratories.

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Composition of the Blood in Onychophora

The primitive terrestrial arthropods of the Class Onychophora are of especial zoological interest. As comparatively little is yet known of their physiology it seems worth recording some measurements of the blood ion-levels in *Peripatopsis moseleyi* and also the composition of a satisfactory physiological saline based on these ion-levels (Tables 1 and 2).

Table 1. Concentration of Ions in Blood of *P. moseleyi* in m.equiv./l.

	Na	K	Ca	Mg	Cl
Average of 7 animals	109*	5·6*	< 20†	< 1 not detected	—
Individual specimens	94·5	3·46	—	—	69·5
	93·2	3·9	6·2	< 1·2	72·0
	96·3	5·14	7·2	—	71·5
	88·2	4·37	2·4	—	74·5
Average of 4 specimens	93·0‡	4·2‡	5·3‡	< 1·2‡	71·9§

The *p*H of freshly drawn blood is 7·3‖.

Methods: * EEL flame photometer; presence of other ions not allowed for.
† Ethylenediamine tetraacetic acid titration.
‡ Unicam flame spectrophotometer *S.P.*900.
§ Electrometric titration.
‖ Beckman drop electrode.

Table 2. Composition of Peripatus Ringer's Solution

	Stock solutions M	Stock solutions g/l.	ml.	Final m.equiv./l.
NaCl	0·54	31·6	198·0	106·9
KCl	0·54	40·2	9·25	5·0
$CaCl_2 \cdot 6H_2O$	0·36	78·2	9·20	6·6
$MgCl_2 \cdot 6H_2O$	0·36	36·6	2·0	1·4
$NaHCO_3$		2·0	2·5	0·6
NaH_2PO_4 anh.		0·1	5·0	0·1

Distilled water added to make up to 1,000 ml. Final *p*H is 7·3.
Glucose: 0·4 g added to 100 ml. before use.

The analyses were based on whole blood, but the ions contained in blood cells can contribute little to the total since haemocytometer counts for six animals indicate only an average of about 5,000 cells/mm³. Two counts by Tuzet and Manier[11] give an average of 2,000 cells/mm³. As the blood cell volume must be less than 0·5 per cent of the blood volume, even the potassium contribution of the cells would be at most only 5 per cent of the whole blood potassium-levels, while that of other ions would be negligible. The blood does not clot.

Dissected preparations of the neuromuscular system remain viable in the physiological saline for at least 12 h at 20° C.

Simultaneous measurements of blood osmotic pressure were not made, but a level very close to 110 mmole/l. sodium chloride, the average of values found by Picken[1] for species of *Peripatopsis*, would be expected if inorganic ions account for the major part of the total concentration.

The animals normally live in moist microclimates and show a preference for high humidities[2]. In dry air they lose water rapidly owing to evaporation from the numerous tracheal openings[3,4]. Those used for the present determinations were kept beforehand under rotting wood on damp cotton-wool, and it will be noted that there is relatively little variation between individuals in the ionic composition. This implies that in favourable conditions the body-fluid concentration is accurately regulated. Certain of the regulatory mechanisms involved are known. Water which might otherwise be lost in the excretion of nitrogenous waste is conserved by the secretion of uric acid into the gut[5]. The nephridia produce hypotonic urine and are probably emptied infrequently[1,5]. In some species water can be taken up from moist surfaces by eversible coxal sacs[6]. Despite these conservatory devices there is likely to be a net loss of water from the body if the animals are exposed to drying conditions. It is interesting to note therefore that the blood concentration is very low in comparison with that of terrestrial arthropods of comparable size belonging to the classes Crustacea, Myriapoda, Arachnida and Insecta[7–10]. It is possible that this low tonicity may be of advantage to an animal occasionally liable to suffer desiccation, since a given water loss will concentrate the body fluids by a smaller absolute amount than if the concentration were higher. Consequently if the volume of any cells is to be maintained constant, the necessary adjustments to the internal osmotic activity and ion-levels will also be of smaller magnitude than otherwise would be the case.

Help from members of the University of Natal is gratefully acknowledged.

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Effects and After-effects on Planarians of Reversals of the Horizontal Magnetic Vector

The freshwater planarian, *Dugesia dorotocephala*, was investigated at Evanston, Illinois, to learn whether it displayed orientational responses to abrupt experimental reversals of the horizontal vector of magnetism comparable with responses recently reported for marine mud-snails, *Nassarius obsoletus*, at Woods Hole, Massachusetts[1]. The study of the planarians extended over the period from April 12 to September 25, 1962, which included nearly 6 synodic months.

Observations were made between 9 and 11 a.m. on 25 days of the first month, 22 days of the second, and 24, 27, 21 and 16 days of the succeeding synodic months, respectively. Each morning two observers independently determined the mean turning rate over a 1-in. course for 15 paths of initially northbound planarians under each of eight experimental conditions in a fixed three-light field in a manner previously described[2,3]. One of the observers alternated the assaying of worm paths in the Earth's field (controls) with worm paths in each of four experimentally reversed fields (0·05, 0·2, 1·0 and 4·0 gauss) presented in shuffled order. The other observer performed the same kind of experiment except for using different field strengths (0·1, 0·5, 2·0 and 6·0 gauss). Each observer worked alternately with the 0·05- to 4·0-gauss and the 0·1- to 6·0-gauss series. The observers were uninformed of the order of presentation of the reversed magnetic strengths and of whether their alternating series commenced with a control or with an experimentally reversed field. Five worms remained in the small orientation vessel and were