is secured by taking monochromatic X-ray radiomicrographs. The method permits of the determination in a tissue of elements of atomic number above 6. Thus with the exception of hydrogen, all elements of biological interest can be determined. Analysis may be made upon a volume of tissue corresponding to that of a mammalian cell. In analyses of calcium and phosphorus in biological material, quantities of 10^{-10}–10^{-11} gm. have been determined by the method with an error of 10 per cent.

A complete theoretical investigation of the method of analysis, a description of the construction of the experimental apparatus and an account of the analytical technique and the experimental results obtained will shortly be published in a supplement to *Acta Radiologica* (Stockholm).

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Role of Ultra-filtration in the Formation of Aqueous Humor

In a previous communication[1], I reported that sodium enters the aqueous humor predominantly by secretion. This implies either: (i) that practically no ultra-filtration at all takes place from the vessels of the iris and ciliary body; or (ii) that the amount of sodium entering the aqueous by secretion greatly exceeds the amount entering by ultra-filtration, even if ultra-filtration still supplies a considerable part of the fluid volume of the aqueous.

If alternative (i) were true, the old question of the relative importance of ultra-filtration and secretion in aqueous humor formation would be solved. If alternative (ii) were true, the problem would still be unsolved. The present work was undertaken to test alternative (ii).

If the secretion is to supply almost all the sodium and the ultra-filtrate a considerable part of all the fluid, their respective sodium contents obviously must be markedly different. But as sodium is the absolutely dominant cation of the aqueous, a marked difference in osmotic pressure would necessarily accompany any large difference in sodium content. If alternative (ii) were true, then the secretion would have a higher osmotic pressure than the ultra-filtrate. The aqueous, being a mixture of the two, would have an intermediate osmotic pressure, and this would depend on the proportions of the mixture. Thus, by reducing the amount of ultra-filtrate, one could change the osmotic pressure of the aqueous towards that of the secretion and, as the secretion is hypertonic, towards higher values of osmotic pressure.

The amount of ultra-filtrate (if any) in the aqueous of one eye was reduced by clamping the homolateral common carotid artery in rabbits. This greatly reduced the filtering pressure and thereby the rate of ultra-filtration. The osmotic pressure difference between the two aqueous humors was determined by the Hill–Baldes thermo-electric method 1·5–2 hours after carotid closure. The mean difference between the side with closed carotid and the control side was $-0{\cdot}5 \pm 1{\cdot}1$ mgm. sodium chloride per 100 ml. (29 experiments on 22 animals, 3–9 determinations of osmotic pressure on each sample). Thus, the blood pressure reduction cannot have augmented the osmotic pressure by more than at most $-0{\cdot}5 + 3 \times 1{\cdot}1 = 2{\cdot}8$ mgm. sodium chloride per 100 ml. or about 3·2/1,000 of the total osmotic pressure. This change is so small that ultra-filtration cannot play any considerable part in the formation of aqueous humor.

A full account of the experiments contained in this and the previous communication will appear in *Acta Physiologica Scandinavica*. A series of papers dealing with the pressure relations after unilateral carotid closure is in the press in *Acta Ophthalmologica*.

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[1] *Nature*, **157**, 770 (1946).

Role of the Earthworm Nephridium in Water Balance

Osmotic and volume regulation have been studied in the earthworm *Lumbricus terrestris* by many investigators, but no very convincing evidence has been presented regarding the part played by the nephridia. Overton[1] observed an initial loss of weight on handling the worm, and attributed this to the expulsion of fluid through the nephridiopores; but Adolf[2] failed to confirm this and concluded that there was "no evidence that the nephridia are at all concerned in the water exchange of earthworms". Since then, Maluf[3] has confirmed Overton's observation and has brought indirect evidence to suggest that the urine is hypotonic to the body fluids. Still more recently, Bahl[4], working on *Pheretima*, collected urine by draining from forty to fifty worms in a glass vessel, and showed that the fluid obtained in this way was hypotonic to the cœlomic fluid.

The purpose of this communication is to state that it has recently been found possible to collect urine directly from a single nephridiopore, by inserting a fine pipette, in sufficient quantity for vapour pressure determination by the Hill–Baldes method. Previous to the experiment, the worm (*L. terrestris*) is kept for some days in tap water, and during the process of collection, which takes two to three hours, it is pinned down in a moist chamber. Since the orifice of the pipette is readily blocked with mucus, etc., only a limited proportion of attempts are successful, but results have been obtained as follows, osmotic pressure being expressed in terms of the equivalent concentration of sodium chloride per cent.

Experiment	Cœlomic fluid	Urine
1	not recorded	0·10
		0·12
2	0·41	0·06
		0·05
3	0·65	0·19
		0·14
4	0·52	0·08

These results, although thus limited, are sufficiently clear-cut to indicate that the urine is strongly hypotonic to the cœlomic fluid, which implies that the nephridia have an active role in water balance.

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Oct. 10.

[1] Overton, E., *Verh. Phys.-Med. Gesells. Würzburg*, **26**, 277 (1904).
[2] Adolf, E. F., *J. Exp. Zool.*, **47**, 31 (1927).
[3] Maluf, N. S. R., *Zool. Jahrb.*, **59**, 535 (1939).
[4] Bahl, K. N., *Quart. J. Mic. Soc.*, **85**, 343 (1945).