spermatozoa. DNP caused a significant decrease in sodium extrusion from dog spermatozoa (Quinn and White 1967) but a similar effect could not be detected in the ram or bull.

Cardiac glycosides such as ouabain are known to be specific inhibitors of cation transport (Glynn 1957; Whittam 1958) and there is a close correlation between their inhibitory effects and the sodium–potassium-activated ATPase isolated from erythrocytes (Post *et al.* 1960; Dunham and Glynn 1961) and various other tissues (Bonting, Caravaggio, and Hawkins 1962; Bonting and Caravaggio 1963). We have recently demonstrated such an ATPase in ram and bull spermatozoa (Quinn and White 1968) and the action of ouabain in decreasing potassium levels of ram spermatozoa and inhibiting potassium uptake by dog spermatozoa (Quinn and White 1967) are no doubt explicable in terms of the effect of the drug on this enzyme.

The detergent CTAB would be expected to cause destruction of the lipoprotein membranes, resulting in a loss of potassium to the medium and influx of sodium into the cell. The viability of mammalian spermatozoa is adversely affected by hypotonic solutions (Emmens 1947; Blackshaw and Emmens 1951; Wales and White 1958) and our results show that when ram and bull spermatozoa are exposed to a medium containing a lower concentration of both sodium and potassium by dilution in water there is a marked loss of both cations from the spermatozoa.

When ram and bull spermatozoa are cooled and kept at 4°C, potassium is lost to the plasma and sodium gained. O'Shea and Wales (1967) have come to a similar conclusion and these experiments provide further evidence that the maintenance of normal sodium and potassium gradients in semen are dependent upon the metabolism of the spermatozoa.

The reduction of potassium and elevation of sodium levels in spermatozoa by dilution or washing in potassium-free sodium phosphate, confirms previous observations (Dott and White 1964; Quinn, White, and Wirrick 1966; O'Shea and Wales 1966, 1967). Incubation of the spermatozoa at 37°C after these procedures, however, almost invariably results in a further loss of potassium, even when the suspending medium contains some potassium. Clearly, dilution or washing is likely to damage spermatozoal membranes and causes an increase in permeability to cations. This makes it difficult to demonstrate any uptake of potassium or extrusion of sodium from spermatozoa incubated after cold storage unless undiluted semen is used or the semen is diluted in dialysed seminal plasma containing high molecular weight substances which presumably stabilize spermatozoal membranes. The results using these systems confirm the observation of O'Shea and Wales (1967), and clearly demonstrate that ram and bull spermatozoa, like those of the dog (Quinn and White 1967), are capable of transporting potassium and sodium against concentration gradients.

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