Dehydration, or the injection of an extract of 1/100 of a toad pituitary into the dorsal lymph sac caused:

1) Marked antidiuresis.
2) A rise in creatinine and osmotic U/P.
3) A variable decrease in filtration rate (creatinine and inulin clearances were identical within the errors of the methods when they were measured simultaneously).
4) An invariable decrease in relative free water clearance.

The occurence of tubular antidiuresis in response to dehydration and to small doses of toad hormone suggests that this is a physiological pattern of response. Large doses of mammalian hormone (1-10 U/kg) are necessary to produce a comparable effect. This indicates significant class specificity of neurohypophysial principles.

Increased Reabsorption of Water from the Urinary Bladder of the Bullfrog, Rana catesbiana, in Response to Dehydration and Neurohypophysial Extracts

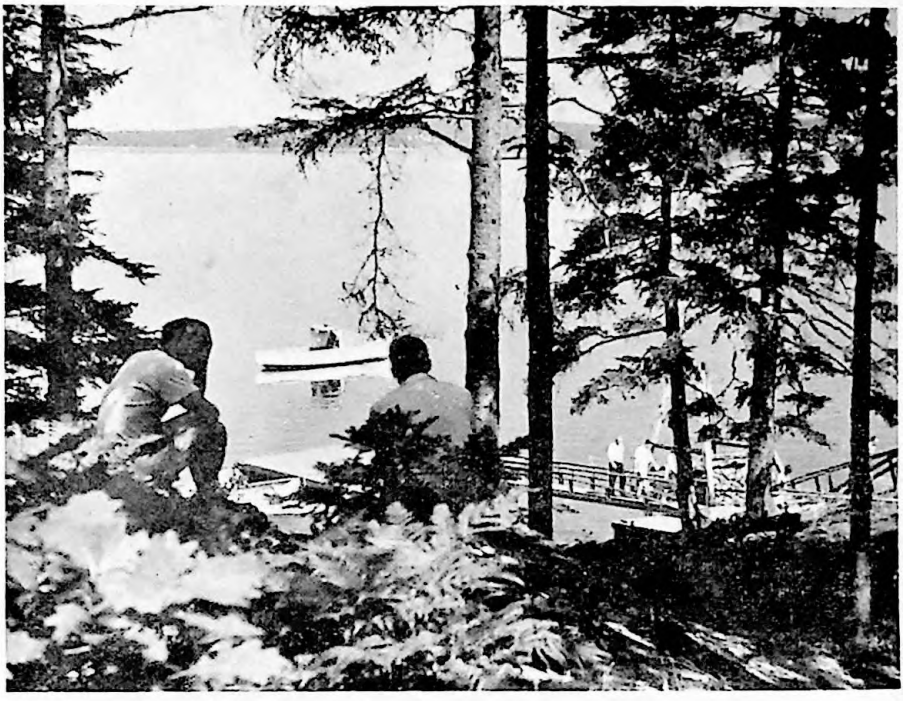
Richard M. Schisgall* and Wilbur H. Sawyer
New York University

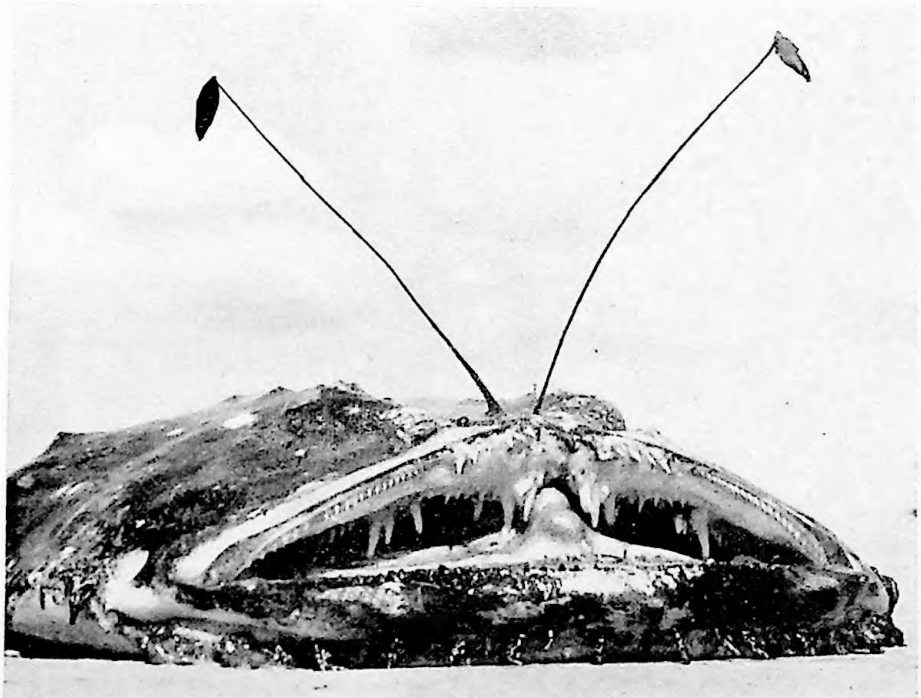
Water disappears from the bladder of frogs and toads in response to dehydration (Steen, 1929) or the administration of neurohypophysial extracts (Ewer, 1951; Sawyer, 1955). This phenomenon might be attributed to increase permeability of the bladder wall or to increased cloacal or intestinal absorption. In these experiments we have sought to determine the site of water absorption.

Large male Lousiana bullfrogs (*Rana catesbiana*) were anesthetized by immersion in tricaine methanesulfonate (MS 222, Sandoz). A polyethylene cannula was inserted through the cloaca and secured in the neck of the bladder by a purse-string ligature. A solution of bovine albumin labelled with T-1824 was then placed in the bladder. Portions of this solution were withdrawn at intervals and the dye concentration measured. The loss of water calculated from the changes in albumin concentration correspoded closely to the decrease in measured volume, indicating that there was neither significant leakage nor loss of albumin from the bladder.

Water leaves the bladder of a well-hydrated frog at a slow rate, averaging 0.0136 ml/hr/cm^2 of bladder surface. Dehydration increases this rate to 0.0658 ml/hr/cm^2. Mammalian neurohypophysial extract (pituitrin, 20-100 U/kg) or an extract of bullfrog pituitaries administered to maximally hydrated frogs produces rates of reabsorption averaging 0.0656 ml/cm^2/hr.

* Lederle Medical Student Research Fellow.





These experiments demonstrate that water is reabsorbed from a hypotonic solution through the bladder wall. Dehydration and neurohypophysial extracts increase the rate of absorption. Increased permeability of the bladder to water, permitting more rapid osmotic penetration, would explain this response. The mechanism so conceived would resemble the change in permeability of frog skin induced by dehydration or neurohypophysial extracts. Reabsorption of water from dilute bladder urine may be a response of adaptive value to the frog under conditions of dehydration.

Urea Excretion in Toads and Frogs

Bodil Schmidt-Nielsen and Judy Slater
Duke University and New York University

Renal tubular secretion of urea has frequently been demonstrated in the frog. Studies of the urea excretion in the toad, *Bufo alvarius* (B. Schmidt-Nielsen and B. Bowers, unpublished) showed that urea does not appear to be secreted in this species, to the contrary filtered urea diffuses back into the blood at a high rate (the U/P ratios for urea rarely exceed 1.2 to 1.5 even at high tubular or bladder reabsorption of water). The present study was undertaken to investigate if: (1) urea in various species of toads is excreted passively or can be actively secreted or reabsorbed and (2) different species of Rana all possess the ability to secrete urea by tubular activity.

Results: *Bufo marinus* was found to concentrate urea in the urine to a slightly higher degree than *Bufo alvarius*, urea U/P ratio up to 3.5 were observed. Plasma urea concentration was maintained at a lower level (8-10mM) than in *Bufo alvarius* (20-25mM). The urea clearance was usually lower than the creatinine clearance. Experiments with DNP failed to show conclusively whether or not urea excretion was affected. Urea injection in the dorsal lymph sac resulted under certain circumstances in urea clearance exceeding the creatinine clearance. Urea clearances in *Bufo marinus* exceeding the filtration rate have also been observed by W. Sawyer (personal communication). *Bufo alvarius* did not show tubular secretion of urea under similar circumstances. Later experiments with *Bufo fowleri*) normal plasma urea concentration 5-8mM) indicated some ability to secrete urea. All species of Rana studied, *Rana pipiens*, palustris and *sylvatica*), secreted urea, (urea clearances 4 to 5 times as high as filtration rate).

Conclusion: There is a considerable difference in the urea excretion in Rana and Bufo (Order Salienta). While all species of Rana investigated secrete urea at a high rate and maintain a low plasma urea concentration (about 1mM), species of Bufo maintain higher plasma urea levels and the amount of urea excreted is usually lower than the amount filtered.