

## LOVEBIRDS

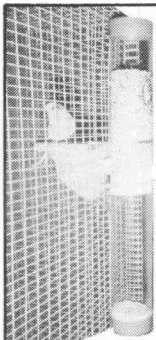
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# Understanding Nutrition

**A Personal Story and Some  
Theoretical Considerations**

by Richard D. Tkachuck, Ph.D.

*Editor's Note: Perhaps the major reason why most people are in aviculture is to observe and propagate birds. The enjoyment received from watching these creatures grow and develop can be matched by few other activities. If it were possible to never clean, water and feed these birds, but merely enjoy their activities, most of us would probably desire this. However, birds do require much care and since most are confined and not given the freedom to follow their natural instincts, it becomes important for the aviculturist to understand his birds so as to provide them with an optimum environment. Much information that is passed around concerning bird care is filled with myth and is based upon limited experiences. Such information in the hands of an inexperienced person can lead to disappointing and sometimes lethal results. As times approach when bird acquisition will become more difficult due to fewer imports, it is imperative that aviculturists have a solid scientifically based knowledge in all aspects of bird care. The time may be near when the death of even the most common bird will carry with it a significant sense of loss. For these reasons the following series is being initiated. It hopes to provide the bird-keeper with a sound base of information that will aid in the proper nutrition of birds. The present article begins with a fish story and ends with some theoretical considerations.*

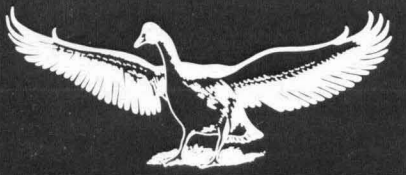
## THE FISH STORY

At the age of fourteen I had the privilege of being employed at the Chicago Zoological Park (Brookfield Zoo). Although the then exciting aspects of working at a zoo for the mighty sum of sixty cents an hour have faded, several things of greater significance have remained. One of these was the development of a friendship with Ralph Small. When first we met, Ralph was a guard at a main entrance, a position he held after

encountering a not-so-friendly Giant Panda. I was assigned to assist him with a rental concession of kiddie strollers and wheelchairs. It was not too long before we discovered a mutual interest in animals. Ralph would bring various pet journals for me to read. At that particular time my interests centered around tropical fish. Ralph had a significant interest there also. What I read at those times has long been forgotten, but what has remained concerns a short conversation held one summer day. Although the precise situation is slightly foggy as one looks back over the years, the main thrust and intent has become more clear and vivid with time.

As memory serves, I was one day looking through a tropical fish journal and came upon a technical article dealing with water conditioning as a part of aquarium management. Ralph, knowing the dreams that were running through my fourteen-year-old head, stated that if I wanted to succeed I should know, understand and practice that technical information. Such statements to a young hobbyist were truly disheartening. The technical stuff was a bore, totally uninteresting. I wanted stories about how others had bred these animals and, in my imagination, I dreamed of the future. It was simple: fish were fish. The fact that they were alive should mean that they should grow, look good and reproduce like rabbits.

Through continued association with Ralph the need for technical excellence became more vivid. As I would visit his home and see fish tanks filled with young while my tanks contained only unproductive adults, the desire to learn these boring technical aspects became more stronger. That I truly needed such information was forcibly brought home when he bought some fish from me that I was unable to have reproduce. I visited him about 6 weeks later and was utterly shocked to see these same fish completely changed. They were over twice the size as



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when I had them and they had an enormous brood of young. Not only that but he raised them to maturity and sold them at a profit to the same pet store where I purchased the adults.

Why this long prologue about fish in a bird journal? Although the animals are different, the principles are the same and are more strongly applied to the raising of birds. The technical information concerned with raising birds does not feed the imagination as does an article on the breeding of an exotic bird. But the understanding and application of these technical ideas can rapidly change a person who dreams of breeding that favored species into one who has actual success.

Ralph Small has long since given up working with fish. As perhaps many readers already know, Ralph has received several medals for first captive breeding of certain birds. In the time that I have known him he had had success with a variety of cockatoos, macaws, grass parakeets and certain African parrots. This all done under artificial light in a small basement in a

Chicago suburb.

The article presented below is the beginning of a series which hopes to acquaint the reader with the various aspects of cage bird nutrition. It will approach this information first from a position of what is known in the basic sciences of biochemistry and physiology, and then attempt to take this information and apply it to the better keeping of birds. It is the hope of the author that this information will be presented in non-technical jargon and made understandable and readable to most. What appears below is a discussion of the concept of the limiting environmental factor. Later in the series such topics as amino acid and protein requirements, carbohydrate, lipid, vitamins and minerals will be considered.

It is presently considered by most biologists that each species of animal has its own set of peculiar and maybe even unique environmental and nutritional requirements. If these needs are not met, the specific animal and even the species will not survive. Extinction

of various species in the past has come by the elimination of a needed survival factor. Forshaw in his *Parrots of the World* makes an interesting historical discussion of the extinction of the Carolina Parakeet. It is obvious that a particular species requirements are not totally rigid and that there is some flexibility. Throughout the life cycle on an individual these requirements change. Several non-biological factors can affect the survival of a species. These may include physical support, light, temperature, rain, soil conditions, and several others. These requirements and how they will affect a bird will await the writing of another series. It is the nutritional factors that are our present concern.

In 1840 Justus Liebig, an agriculturist dealing with crops, discovered that plant growth and production was limited when certain nutrients were in short supply. From these observations he developed a concept which stated that crop yield was determined not by those nutrients that were in excess but by those factors that

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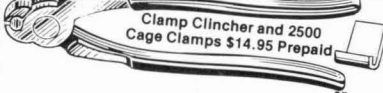
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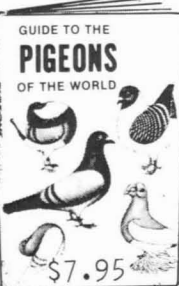
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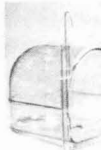
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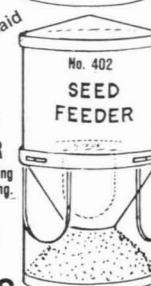
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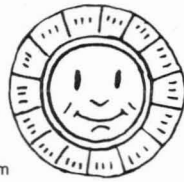
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were limiting. In other words, if ten factors are required for optimal growth, development and reproduction, and one is in short supply, then the organism will only grow to the extent allowed by the factor in short supply. This idea became known as Liebig's law of minimum. It has been observed that if a factor is indeed limiting in the diet of an organism, that the animal will eat excessive amounts of a food so that the factor in short supply can be obtained. This excessive eating can carry with it serious side effects.

In the early part of this century, Liebig's law of minimum was expanded by the work of an ecologist V. Shelford. In 1913 he proposed a concept named the law of tolerance. Where Liebig noted that an organism could be limited by reduced amounts of a specific factor, Shelford noted that an organism could be limited by an abundance of that specific factor. This concept is perhaps most easily understood by using temperature as the variable factor. At low temperatures a bird may have difficulty obtaining water or food because of an ice or snow cover. As the temperature rises, it becomes easier for the bird to live. If the temperature increases to such an extent that the bird can not cool itself and its body temperature increases such that tissues are destroyed, the bird will here find limits of survival. This concept is illustrated in the figure below.

In the wild, the species has adapted itself to the various environmental factors that surround it so that it lives in the range of optimum. When the aviculturist takes a bird from its natural environment and confines it so that it loses its ability to self-regulate, the aviculturist must then make certain that the caged-environment closely mimics the natural one. The quest therefore, of aviculture, is to know the captive species so well that one knows what is the range of optimum for the factors necessary for the species survival.

It is interesting to note that in the history of aviculture, that the longer a species is in captivity and the longer it is away from its wild-caught ancestors, the easier it is to breed. Perhaps this new breeding population has been selected so that its range of optimum more closely matches that provided by aviary than the wild conditions.

The next installment of this series will consider the amino acid requirements of birds, emphasizing the need for a varied diet to obtain all the essential amino acids.