

the by Dr. Raymond Kray Vet's Corner

THE DIGESTIVE SYSTEM FORM, FUNCTION & FAILURE

Part One – Form & Function

Problems relating to this system account for at least forty per cent of the pathologic conditions I see in birds. This statement, however, must be taken with the understanding that when one system is the primary or target focus of an infection or functional problem, other systems may perform abnormally. The symptoms we see are all due to altered function, therefore, in an evaluation we must be familiar with the normal.

The prime purpose of the gastro intestinal or G.I. Tract is the processing and absorption of nutrients necessary for the life of the cells that make up a living organism.

In its broadest sense this could include enzymes and hormone producing organs such as pancreas, adrenal, pituitary, liver and gall-bladder which aid in the biochemical alteration of certain food substances. For the sake of this article, however, I will limit the scope to the linear tract which extends from the throat to the anus.

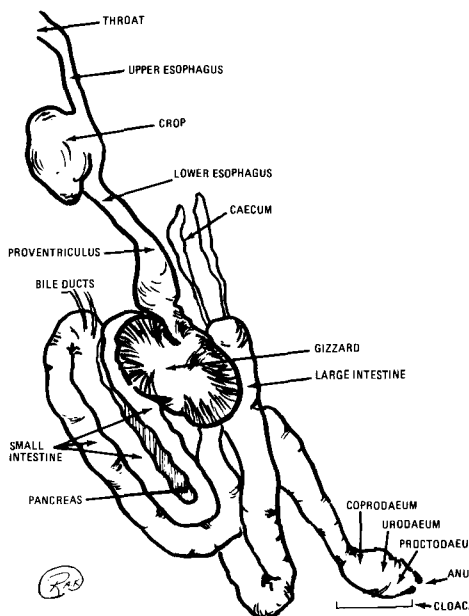
The various divisions are cellularly different by microscopic examination or anatomically distinct; they are listed below in the normal sequence:

- throat
- upper esophagus
- crop
- lower esophagus
- pro-ventriculus
- gizzard
- smaller intestine
- duodenum
- ileum
- larger intestine
- cloaca
- coprodaeum
- urodaeum
- proctodaeum
- anus

The throat merges into the esophagus dramatically or indistinctly, depending on whether our description is of a pelican, a parrot or a pigeon. In the pelican the throat is very elastic, forming a sac for the temporary storage of food – there is no well formed crop. The throat of the pigeon is relatively non-elastic and a short distance down the esophagus we find it enlarged to form a muscular elastic sac. Grain eating birds or graminivores, besides storing seed in their versatile crops, put them to a variety of uses. The elastic

and circular rings of muscle make possible a rapid constriction and decrease in crop volume resulting in movement of the food contents back into the mouth or vomiting.

Types such as psittacines which eat seeds rapidly will usually retire to a perch where, in relative security, they will regurgitate the seeds to remove the hull or reduce the size of the kernel. Regurgitation of hulled seeds presoaked and softened into the mouths of their young is another necessary function of the crop. We also find that in pigeons, doves and psittacines the crop lining and possibly the proventriculus produces a milk-like liquid of high fat, protein and vitamin content which is the exclusive food of the fledglings until they are able to process and digest whole seed.



Stress, brought on by fear, often elicits vomiting of part of, or the entire, crop content allowing the bird to rid itself of extra weight and volume in preparation for a rapid flight to escape an enemy.

Poisons, spoiled or foul tasting food can trigger the vomiting reflex and thus the body rids itself of dangerous substances before any more can be absorbed.

Storage of water for transportation to young in nests far from the natural source of water, as is the case with sand grouse, is yet another use for the crop.

Some types of storks, geese and pigeons inflate the crop with air or air sacs and make use of it as a courtship display or in producing courting sounds.

So much for the crop. Now moving on down to the lower esophagus we find it entering the body cavity above the clavicle or "wish bone", along with and parallel to the trachea, where it enlarges to become the pro-ventriculus or glandular

stomach. This organ's main function is to secrete gastric juices and act as a conveyance of food to the gizzard. The proventriculus usually has a tubular form being more expansible in fish eating birds which feed on large food, and more narrow in grain eating types, especially parrots, which chew their food. Gastric juice consists of hydrochloric acid and pepsin – a protein digesting enzyme which reacts most efficiently in an acid medium. Amylase has been reportedly found, but its origin has not been verified. The amount and rate of digestive juices secreted by the proventriculus appears to be regulated by the kind and texture of the food contents in the crop and proventriculus. The acidified and pepsinized food now moves on down the G.I. tract to the gizzard, which is also known as the ventriculus or muscular stomach.

This ventriculus is a highly specialized organ with strong, well formed muscular walls and a thick tough proteinaceous lining which frequently sloughs off. It has its own local nervous system, much like that of the heart, which controls its own contractions along with those of the proventriculus and part of the small intestine. It is therefore able to regulate the rate at which food passes through it, shortening the time for easily digested food like fruit and prolonging it for the more difficult to digest grain and nuts. Logically, then, another of its functions is to propel the food into the remainder of the intestinal tract. Further physical breakdown is also enhanced by the presence of gizzard stones which, however, are not absolutely essential for digestion.

Now, theoretically, all food has been physically pulverized and chemically simplified and is ready for further processing and refining in the small intestine. In the duodenum of the small intestine the food mixes with a digestive enzyme, pancreatin, from the pancreas and bile from the gall-bladder of the liver. These enzymes change the acid content from the stomachs to a base pH, necessary for the digestion of fats, sugars and starches.

The walls of the duodenum also secrete the enzymes for digestion of carbohydrates, and are aided in this endeavor by the non-pathogenic bacteria making up the normal intestinal flora of the gut. We also find in the walls of the small intestine, highly modified cells which are able to absorb and transport the digested and simplified food directly into the blood stream. Some of these cells secrete water to aid in the mixing and passage of food down the G.I. tract.

At the junction of the small and large intestine some birds have another organ

Contd on pg 27

DON'T TREAD ON ME

by Joseph Griffith



The symbol that leads this article was used by the colonists to warn the British that they intended to stick together in their fight for independence. It is this unity that won them the day, and it is the need for a similar unity that prompts this article.

No one can deny that there are good reasons for some of the infighting that goes on between many factions of those who keep animals of one kind or another. There is no reason why legitimate arguments of this kind should not continue; they sometimes do some good.

But there is another way of looking at it. EVERY PERSON WHO DEALS WITH ANIMALS, IN WHATEVER CAPACITY, HAS A COMMON INTEREST WITH EVERYONE ELSE WHO DOES SO. The USDI has been working very diligently to separate the various interests of persons interested in animals in an effort to be able to deal with us piecemeal. Unfortunately it has had some success. Zoos don't like the pet industry, hobbyists don't like commercial interests, researchers want everyone else put down except themselves. The result is that each of us is losing. The ultimate intent of the Injurious Species Proposal is to halt the importa-

tion of ALL animals and unless we stand together, this will happen.

If a total ban is successfully instituted, the next step will be to ban possession. What will you do then? Hobbyists will lose the animals that they enjoy so much, zoos will slowly fade out, researchers will be unable to work, and several thousand people will be out of jobs.

On April 16, I went to Washington on behalf of PIJAC. The meeting was held at the offices of Marshall Meyers, attorney of record for PIJAC, and was in the nature of a council of war. I spent four days there and brought home a stack of materials concerning birds that will have to be worked on in the 30 day period following the meeting. (Long before this appears in print.)

Here are some of the things that I learned.

Mr. Meyers is not only working on behalf of the pet industry and hobbyists, but he is also working very closely with the attorneys for ZOOACT (Zoological Action Committee). This group should not be confused with the AAZPA (American Association of Zoological Parks and Aquaria) which is an older and very entrenched organization that refuses to see the writing on the wall and would like to see the pet industry and hobbyists put down.

The Lacey Act is a criminal statute. In such a case, the burden of proof lies with the accuser (the USDI). Legally and ethically the USDI is constrained to prove that each and every animal is injurious. This is a point that should be pushed for most strongly.

The USDI has failed to publish criteria for injuriousness. The only document available is an inter-departmental memo entitled, Provisional Criteria for Injurious Wildlife. This has no legal standing. It is interesting to note that several persons at the Smithsonian Institute are of the opinion that there is no way in which the USDI can apply these provisional criteria to any animals.

PIJAC is going for a Dirty List. In the event that this cannot be made to stand alone, a tripartite list will be sought. Such a list is similar to that described by me in a former article in this magazine.

A. Injurious. Entry under permit only and with severe controls.

B. Not Proved. This would be all wildlife not mentioned on the A or C lists. A modest permit would be required. Records would be kept of all wildlife sold, traded or given away. Transfer of animals would only be to holders of similar permits, but acquisition of permits would be so easy that it would not be a problem. Reports of transfer or death of animals in this category would probably be made yearly.

C. Unrestricted. No permit required. PIJAC is asking for a hearing before the House Committee on Merchant Marine and Fisheries. This committee held a hearing on December 12, 1974, but they only listened to the USDI. The committee has a new chairman and there is now a chance that the other side of the story will be heard.

The USDI hopes to have the proposal finalized and in effect in July of this year. As soon as possible thereafter, Marshall Meyers will file a complaint before the court. This will force the USDI to prove its case before the court. There's not much likelihood that it can.

All of this takes funds and anyone who wishes to make a contribution is certainly welcome to do so. But, more important is a unified stand. PIJAC, ZOOACT and AFA are gathering experts in every biological specialty to testify before the congressional committee and the court.

PIJAC and ZOOACT intend to have a bill introduced before the congress that would create a new agency that would have sole authority over all animals and animal products not imported as processed foods. One of the stipulations of this bill would be that it maintain an advisory council composed of all of the various groups concerned.

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