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ADAPTIVE BASIS OF THE RANGE EXPANSION OF THE CATTLE EGRET

SNOWY HERON OR WHITE EGRET by John James Audubon, American School

James A. Kushlan, Marilyn S. Kushlan
Homestead, FL
Joan A. Browder, Peter A. Schroeder
Miami, FL

The cattle egret (*Bubulcus Ardeola (Egretta) ibis*) has undergone marked expansion of its range (Sprunt, 1955, Smith. Misc. Rpt. 4198: 259-276). Although the population expansion has been well documented, some of its causes have only recently been elucidated (Blaker 1971, Ostrich Supl. 9: 27-30). We discuss here the adaptive basis permitting this expansion.

Population fluctuations are sometimes accompanied by or may be caused by genetic changes (Carson 1967, pp. 123-137, in Lewontn (ed.), Population biology. Syracuse Univ. Press). Such genetic changes often accompany the isolation of a small population. In such populations, genetic drift or the effect of chance is often taken to be the major factor influencing changes in gene frequency. Isolated populations in an evolutionary bottleneck (Nei, Maruyama and Chakraborty 1975, Evolution 29: 1-10) can also be subject to gene fixation. Relatively few incidences of selection can have a weighty impact on a population having a reduced gene pool. We propose analagously that the critical role of periods of high electivity be called the survivors principle and suggest that the cattle egret represents a stunning example of this.

Around 1910, the population in Egypt was reduced to less than 500 individuals. Immediately after the restriction of plume hunting by the British administration, the cattle egret underwent its dramatic range expansion that is characterized by its association with large mammals. A segment was restricted to a roost located in the zoological gardens of Cairo. The survivor principle provides that those birds that perservered the zoo period provided the genetic stock responsible for the later expansion.

We propose that this occurred through behavioral phenomenon we call negative fecaltropism. During the period of range contraction, the zoo provided suitable foraging habitat where the egret was undoubtedly associated with large mammals such as elephants (*Elephas africanus*), with which they were forced to feed. There is considerable risk associated with foraging in close proximity to such a large animal. This risk is not distributed uniformly along the animal but varies along an anterior to posterior gradient. Risk is particularly great for those birds foraging beneath the hindquarters of such beasts (Fig. 1). Such impact would place a premium on being associated with the forequarters of the

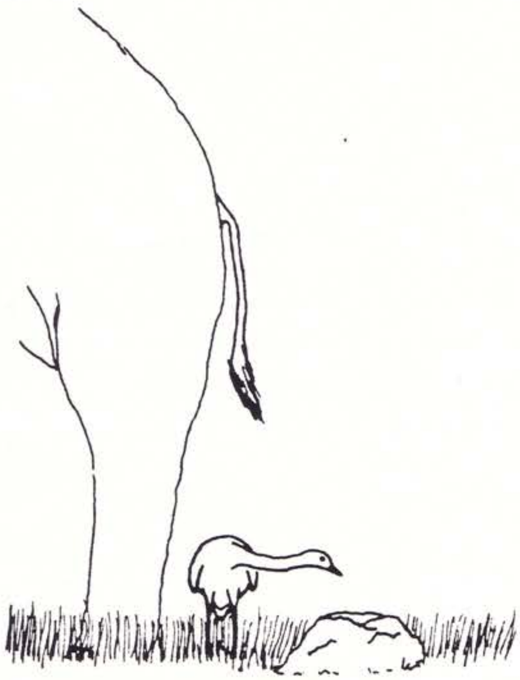

FIGURE 1. Cattle egret foraging near the rear of an elephant examining a recently deposited pile of feces that buried its more posteriorly foraging associate.

larger animal. Those egrets foraging there, by moving along with the elephant, encountered increased opportunity to obtain invertebrates made more conspicuous by the elephants movements. Feeding on these prey increased net return to the egret. Natural selection through negative fecaltropism led to the commensal foraging behavior later to become associated with the more ubiquitous cattle.

To determine the significance of negative fecaltropism, it would be necessary to set up a field experiment. If cattle egrets partitioned the cow and tended to cluster at the head rather than under the tail, negative fecaltropism clearly would be indicated. Fortunately we did not have to conduct the experiment since Grubb (1976, Wilson Bull. 88(1): 145-148) independently determined that this was true. Although he concluded that egrets occurred more frequently in the head region because of increased foraging return there, as we have shown, this is a secondary attribute of negative fecaltropism, which thus is the ultimate selective factor.

We feel that the selective advantage of avoiding the rear coupled with the increased energy input from forward commensal foraging provided the ecological advantage that permitted the cattle egret to expand into large herbivore-dominated habitats worldwide. ■

Dear Sir:

A patient's report of bioluminescent feces - "stools glowing in the dark" - has long been held to indicate the likelihood of significant psychopathology. In my own practice, I have found this symptom to be more reliable than a report of dental pruritis - "itchy teeth" - although not nearly as pathognomonic as a report of spontaneous combustion of flatus. I would like to report a recent case of pseudobioluminescent feces in an animal model, to alert my colleagues to a likely cause of this symptom.

On a July evening, at approximately 11 p.m. with an ambient temperature of approximately 75° the author was traversing a fenced enclosure when he noted the sudden onset of a squishy sensation between his bare toes. Closer inspection revealed the substance to be feces, recently passed by a 20 kgm., 44 week old Golden Retriever puppy. Observation revealed multiple areas of the stool to be glowing brightly.

Further research revealed that the Golden Retriever puppy had recently ingested approximately 45 grams of the material from a 115 gram Professional model "Moonlighter" Frisbee. This model Frisbee is constructed of a luminescent plastic material for play after dark.

Since the luminescent stools are obviously secondary to the ingestion of the glow-in-the-dark plastic this does not represent true bioluminescence, but rather "pseudobioluminescence".

The implications of this are clear. Physicians must add the possibility of occult frisbeephagia to their differential when a patient reports his stools "glowing in the dark". In these situations it would appear wise to obtain a stool for blood, ova, parasites and Frisbee. Any well equipped clinical laboratory should be able to make the distinction without difficulty.

Yours truly,

Charles Davant

Retreat into general objectives on which everyone can agree. From this higher ground you will either see that the problem has solved itself, or you will forget it.