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## **PATHOLOGICAL CHANGES IN GREEN IGUANAS (IGUANA IGUANA) FROM COSTA RICA. RETROSPECTIVE STUDY (1991-1994)**

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### **Introduction**

The keeping and breeding of Green Iguanas (*Iguana iguana*) in a confined area is a unique international project. The ones owned by the Green Iguana Foundation, are raised in captivity in Turrubares located in a transitional forest (between the dry and rain) area of Costa Rica. This project aims at several goals: protecting the Green Iguana on Costa Rica, making the local people aware that these animals can be bred fairly easily under rather primitive circumstances and provide a cheap extra source of this appreciated meat.

The Department of Veterinary Pathology, Universidad Nacional, Heredia, Costa Rica has been working with this performs the necropsies of animals which died in the breeding area.

The material is unique in that no data are available about the pathology of the Green Iguana living in a (semi-) wild state. Thus it seemed worth reporting about the findings.

### **Materials and Methods**

During the period between June 1991 to June 1994, 85 necropsies in green iguanas were performed. In each case the macroscopic findings were brought into protocol. The samples were fixed in 10% buffered formalin. The specimens were routinely embedded in paraffin and stained with haematoxylin eosin (H. & E.). In special cases extra stain, such as P.A.S and Grocott were used. All animals were subjected to systematic detailed morphological and etiological investigation mainly based on organ system pathology to verify cause of illness or death. Subsequently the pathological lesions were recorded by organ-system in each iguana and summarised. In this study, the 85 animals were divided into three age groups:

A: Neonates-up to one month old (n = 36)

B: Juveniles - between one month and one year old (n = 14), and

C: Adults-over one year (n = 35).

## Results

### A: Neonates

In the group of neonates, 19 out of 36 animals exhibited severe hepatic degeneration. This was seen as a swelling of the hepatocytes, which revealed a cloudy aspect of the protoplasm. Eight iguana-babies were found to have umbilical inflammation. Other three neonates were blind, one had granulomatous peritonitis and another showed biliary duct metaplasia. In four, no remarkable findings were detected.

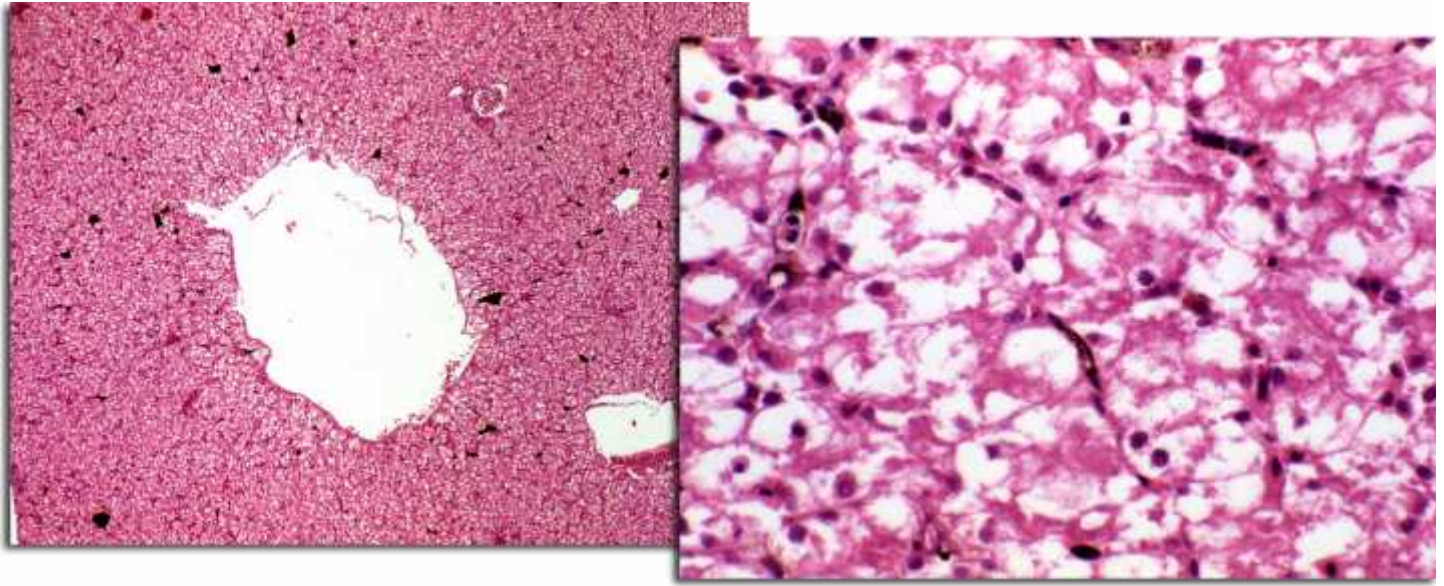


Fig1. A general liver view. The hepatocytes show a diffuse empty spaces (vacuolization). Fig. 2 a close-up. H. E.

### B: The juveniles

In this group, three iguanas were found to have suffered from spinal cord degeneration, two had typhlitis with protozoa present in the mucosa, and one animal showed an ulcerative necrotic gastritis. No important pathological findings could be found in the eight remaining animals.



Fig. 3. A group of juvenile iguanas showing scoliosis. Also with spinal cord lesions.

### C: Adults

According to the anatomical localization, the lesions were **subdivided** into:

**a)-Oral cavity (6x).** Six iguanas exhibited necrotic ulcerative inflammation diagnosed as: ulcerative stomatitis (2x), stomatitis with glossitis (**1x**), ulcerative necrotic glossitis (3x).



Fig.4. The oral cavity with a lot of purulent material. Fig.5. Tongue with severe necrosis and ulceration. To the left normal lingual papilla's are still present.

**b)-Stomach (6x).** Five animals showed a variable degree of regional chronic hyperplastic cystic gastritis. The characteristic in common of these changes was a hyperplasia of the mucosa, with formation of polyps. In the affected areas the stomach glands showed irregular cystic enlargement, and there was an increase in stroma with a variable number of heterophils invading. In one animal an ulcerative gastritis was diagnosed.

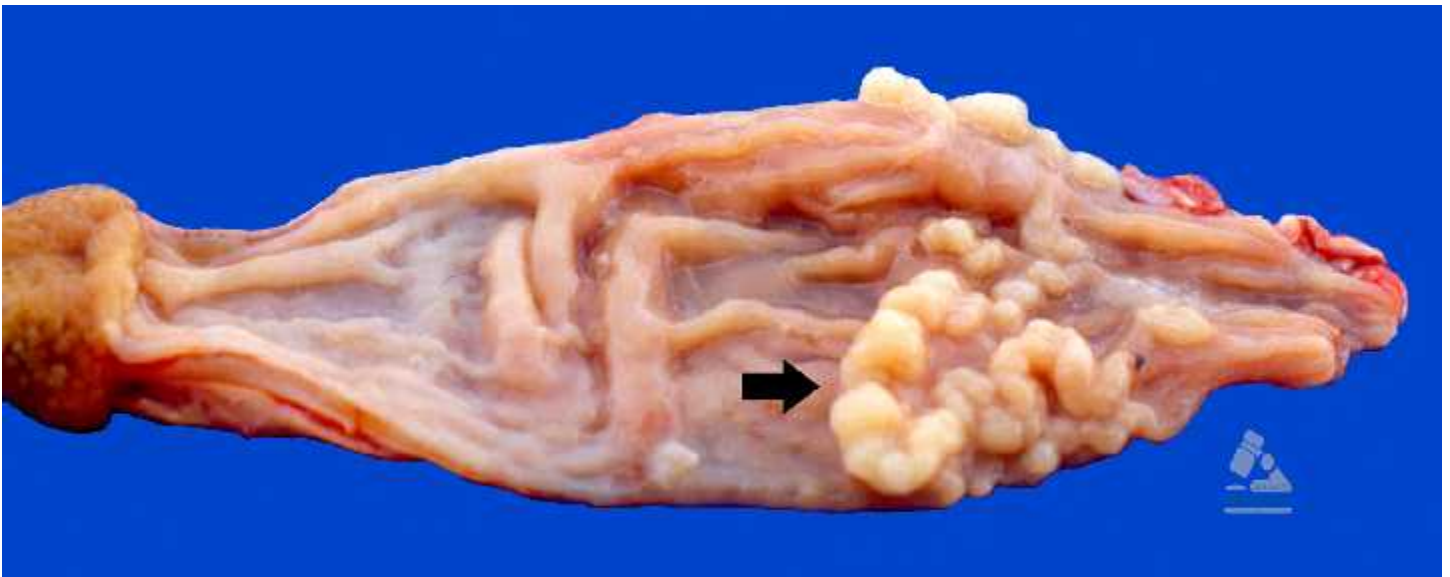


Fig.6. The stomach with a focal mucosa proliferation (see black arrow).

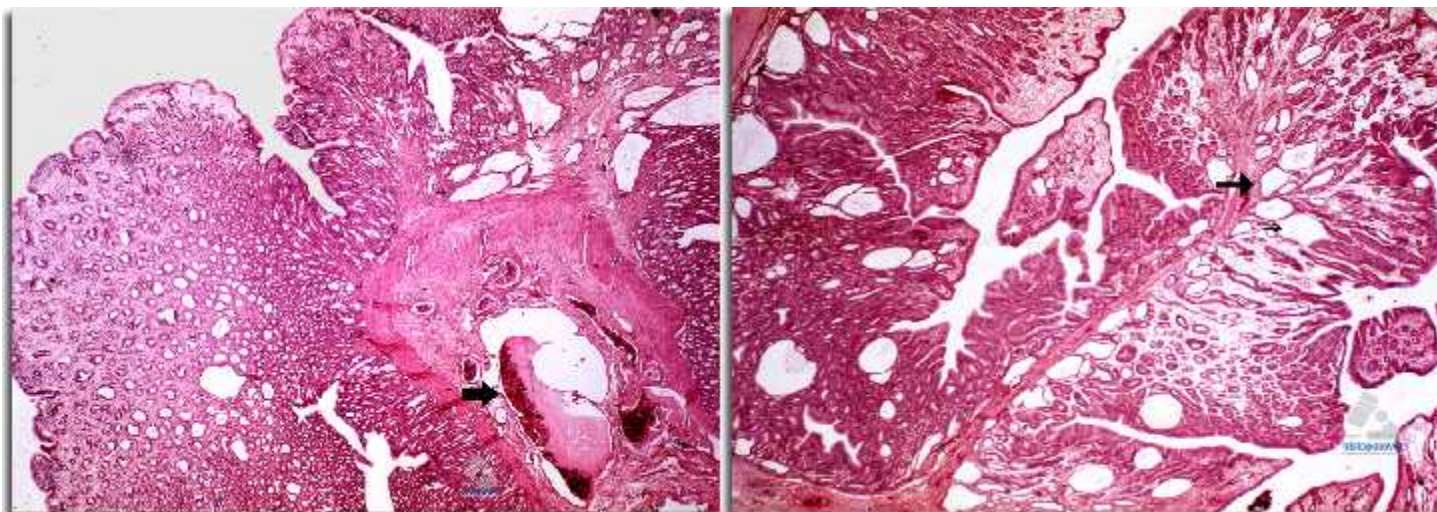


Fig.7 and Fig.8. Two different images of polyp's formation with dilated cystic glands. See small black arrows. Thick black arrow (Fig.7) indicates at a vascular vessel.

**c)-Intestinal tract** lesions (7x) were subdivided into: typhlitis caused by Nematodes (2x), membranous typhlitis (1x), ano-rectal ulceration (1x), enterolith (1x), focal intestinal granuloma (1x), and focal submucosal caecum cyst (1x).

**d)-The hepatobiliary system** was involved in 14 iguanas. The recognised phenomena were: degenerative disorders (4x), granulomatous hepatitis due to ectasia of the biliary ducts (7x), biliary duct cyst (2x), and hepatic abscess (1x).

**e)-The respiratory system** was affected in 12 animals. These were: primarily confined to different inflammatory phases of bronchopneumonia, which seems to be most likely due to aspiration, in fact 10 animals showed this picture, the remaining two had dystrophic calcification (1x) and mycotic granuloma (1x).

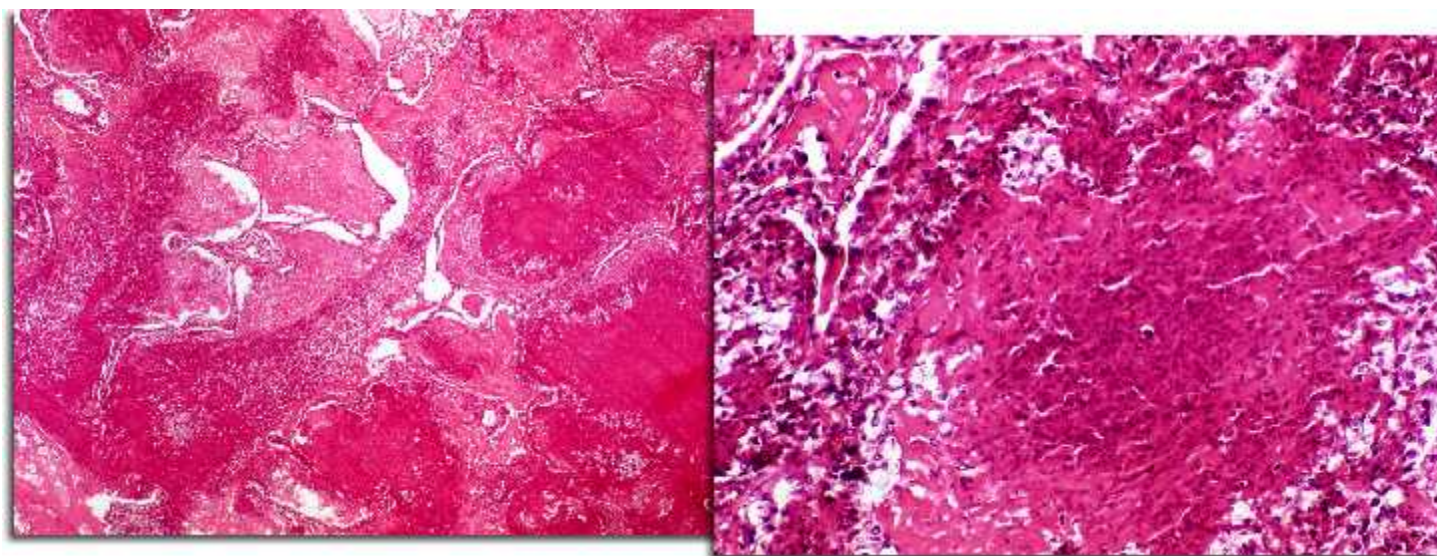


Fig.9. The lungs showing a multifocal eosinophilic necrotic centers. Fig.10 a close-up view.

**f)-The cardiovascular system** was involved in five iguanas as: degenerative atrium-ventricular septum (2x), constrictive pericarditis (1x) and aortic dystrophic calcification (1x).

**g)-The reproductive system** was affected in thirteen animals. Eleven of these were females, revealing retention of eggs (2x), lipid granuloma of the yolk sac (1x), ovarian cyst atrophy (2x), pyometra (1x), ovary (1x) and ovary-uterus (1x) granulomatous inflammation respectively. In addition, three ovarian tumours were found; teratoma (1x), granulosa cell tumour (1x) and cystadenoma (1x). Only two male showed lesions; purulent orchitis (1x) and testicular atrophy (1x).

**h)-The musculoskeletal system** was affected in eight iguanas, muscular dystrophy with mineralisation (2x), muscular dystrophy (1x) and atrophy (1x), lumbar muscular degeneration (1x), osteodystrophy (1x), humerus osteomyelitis (1x) and scoliosis (1x).

**i)-The nervous system** was observed to be affected only in five cases; spinal cord myelomalacia (3x), leukoencephalomalacia (1x) and meningoencephalitis (medulla and pons) (1x).

**j)-Renal disorders** were diagnosed in 2 iguanas: renal like dystrophy (1x) and proliferative membranous glomerulonephritis (1x). Finally, in four animals gout was diagnosed articular (2x) and visceral renal (2x).

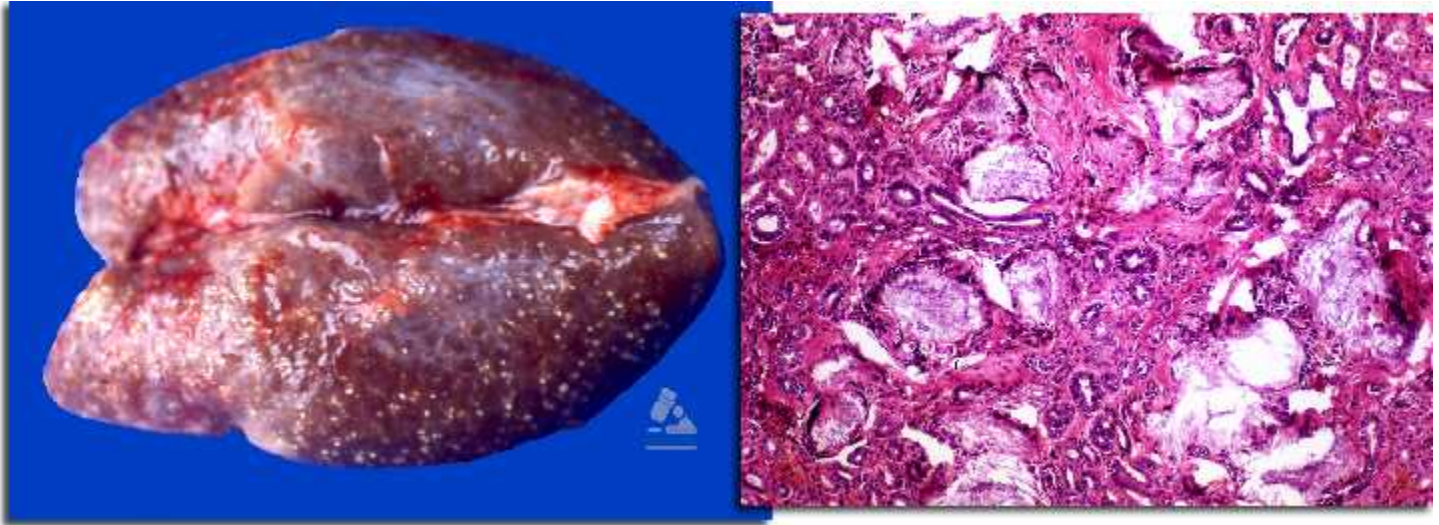


Fig.11. A kidney with multiple white pinpoint tissue due to visceral gout. Fig.12. Renal tubules showing basophilic material (gout).

### Discussion

The main problem in the neonate iguanas is a degeneration of the liver. I speculated about energy-depletion related hypoglycaemia, but the aetiology of this problem could not be solved. Yet it is obvious that the breeding of iguanas would benefit if this problem could be reduced.

It is remarkable that in the group of neonates a fairly high number of congenital disorders such as blindness and biliary duct metaplasia occur. Although the group of breeding animals is not too large, inbreeding could not be ruled completely, but as at random breeding is the natural situation, this seems to be rather unlikely. The outcome of omphalitis led to an improvement of the hygiene in the breeding area, which contributed to a reduction of the problem. In the group of juveniles the spinal cord degeneration was of special interest. Up till now, no specific cause was found. It could be speculated that a deficiency in copper could be a problem.

In the adult group (n=35), 19 iguanas were found to suffer from alterations of the digestive system. This number is fairly high, compared to other reptiles. Keymer (1978, a and b) observed intestinal lesions in 27% of 144 tortoises and in 9% of 158 terrapins and turtles. Intestinal parasites (Nematodes) were responsible for only two death cases in this group. The 5 cases of chronic hyperplastic cystic gastritis were remarkable. They will be described more extensively in a separate paper.

### References

- Keymer, I. F. (1978,a) Diseases of chelonians: (1) Necropsy survey of tortoises. Vet. Rec.103, 548-576.
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