

REPORT ON 3 CAPTIVE GREEN TURTLES-KAPOHO HAWAII

BY DR. ROBERT MORRIS 3/2003

On 3/18 and 3/19/03 physical exams were done and blood samples were taken on three turtles confined in private ponds at Kapoho, Hawaii. These turtles have been living in these separate ponds for over 20 years and are legally owned by the property owners. Permission was obtained from the owners to do the examination and sampling.

A summary of the veterinary findings is presented below.

Turtle #1 "Albert"-Slim Holt Pond

This male turtle is being fed mostly papayas and dry dog food.

Weight 104 lbs

Straight carapace length 63.9 cm

Physical exam:

The turtle appears obese with a soft area of approximately 19cm diameter on the plastron. No tumors were found. Other physical findings were normal.

Blood results:

Elevated alkaline phosphatase, AST and low phosphorus values. Normal PCV and WBC.

Comments

This pond is somewhat restrictive in size when compared to the other two. The feeding of this turtle is dependent on one person with neighbors also feeding an unknown amount and type of food. The blood chemistry values are non-specific and could indicate muscle or liver problems possibly related to diet.

Recommendations:

Have one person in charge of feeding. Eliminate papayas from the diet; decrease protein content of food (restrictive diet dog food) and more dark green leafy vegetables (turnip greens, kale, broccoli, bok-choy). Lettuce has little nutritional value. Better still, purchase and feed only commercial turtle food (reference given at end of report). I can also recommend wild release for the best insurance of good health and well being for "Albert".

Turtle # 2 "Arthurena"-The Yunis family

This female turtle has not been eating for the past few weeks. The owners say this happens every year during the breeding season. The family cares for this turtle and usually feeds papayas and other vegetables and dry dog food.

Weight: too large to lift

Straight carapace length 84.3cm

Physical exam:

This turtle appeared in good flesh. The plastron was firm. No tumors were found. Other physical findings were normal.

Blood results:

There was an elevated alkaline phosphatase, AST and cholesterol. The CA/P ratio and glucose values were low. The hematocrit was low (anemia) and there was a reversal in the heterophil/lymphocyte ratio (infection?).

Comments:

This pond is of adequate size and has a gate direct to the sea. There were definite abnormal values in the blood work. The anemia, low blood sugar and reversal of lymphocyte/heterophils are of some concern. The history of another companion male turtle dying in January of 2000 must be noted. This turtle was found to have a goiter with fatty changes in multiple organs. A lack of a balanced diet may have led to these changes. Perhaps similar changes are taking place in this turtle. The fact that the turtle was fasting could affect some of the values.

Recommendations:

This turtle should receive a more balanced diet. Commercial turtle pellets with seaweed supplementation would be a good choice. Vitamin supplements placed in a piece of squid or fish might be helpful. Release is also an option.

Turtle # 3 "Sam"-Peggy Forges

The grounds keeper is feeding this male turtle. He gathers seaweed (type not determined) several times weekly and also feeds papayas.

Weight 126 pounds

Straight carapace length 69.4cm

Physical exam:

The turtle appeared in good flesh and did not have any tumors. A slight bulge was noted in the right eye but did not present any problems.

The other physical findings were normal.

Blood results:

There was an elevated alkaline phosphatase and AST and decreased phosphorus. The calcium levels were normal. Other values were in the normal range.

Recommendations:

The pond is of adequate size. The seaweed supplementation is good for the turtle. The type of seaweed should be determined because certain types may be detrimental to the turtle's health. I would stop the papaya diet and supplement with dark green leafy vegetables (not lettuce). A commercial turtle pellet would be excellent. It should be noted that the feeding program is highly dependent on the yardman and his efforts to gather seaweed. Release is an option.

Footnote:

The significance in variation of some of the blood values in green turtles is unknown. It is not as an exact science in reptiles as it is in mammals. Many factors such as water temperature, sex, diet, and location sampled and time of year can affect the results. I have used some of our blood results from normal wild turtle to compare values with the pond turtles and made deductions from this. AST and alkaline phosphatase elevations can indicate liver or muscle pathology.

A good option for the turtle owners would be to get together and order dried commercial turtle food. Vitamin supplementation is recommended if this is not done. The address is furnished below.

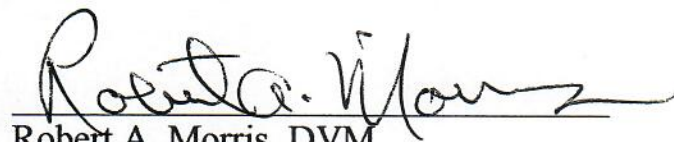
Melick Aquafeed

139 South First Street

Catawissa, Pennsylvania 17820

Phone: 1 800 358-6595

Price is approx. \$14/50 lb. bag plus shipping for turtle finisher pellets.



Robert A. Morris, DVM

Makai Animal Clinic

420 Uluniu Street

Kailua, HI 96734

TURTLE ID	ALBERT	MUNIS	SAM		
DATE	3/18/03	3/17/03	3/19/03		

	MEAN	SD	RANGE			
ALK. PHOS.	33.5	12.2	12-62			
ALT (SGPT)	3.9	7.0	0-50	77	71	157
AST (SGOT)	158.4	41.5	1-270	5	9	27
CK				298	309	935
LDH	203.8	180.4	55-1286	507	809	348
ALBUMIN	1.7	.4	.6-2.2	60	164	101
TOTAL PROTEIN	4.2	.6	2.9-5.6	1.3	1.2	.9
GLOBULIN	2.7	.5	1.8-4.0	3.6	5.0	2.2
BUN	25.8	70.7	0-320	2.3	3.8	2.3
CREATININE	.2	.1	.1-.5	21	19	15
CHOLESTEROL	140	43	32-280	.3	.3	.3
GLUCOSE	114.7	35	64-234	163	297	235
CALCIUM	9.1	1.7	1.1-12.1	9.3	60	85
PHOSPHORUS	8.2	1.3	5.9-11.8	9.5	6.7	8.7
POTASSIUM	5.2	.9	3.9-8.6	5.5	8.1	4.8
SODIUM	158	4.0	146-170	5.8	4.5	4.7
A/G RATIO	.6	.2	.2-1.2	1.58	1.52	1.51
URIC ACID	1.3	.8	0-4.5	.6	.3	.4
CA/P RATIO	1.1	.13	.18-1.0	.7	2.4	.8
				1.7	.82	.8
WBC ESTIMATE						
WBC COUNT	13.8	5.3	5.9-23.6	9-11		6-8
HEMATOCRIT	29	4	17-35	9.1	5.9	7.9
HETEROPHILS	10	3	4-17	31.0	21	30.0
NEUTROPHILS				24	56	15
LYMPHOCYTES	71	8	53-83	2	2	2
MONOCYTES	6	3	4-17	74	42	82
EOSINOPHILS	13	6	4-29			
BASOPHILS	0	0	0-1			1
ABSOL HETS	1380		236-4012			
ABSOL NEUT				2184	3304	1185
ABSOL LYMPH	9798		3127-19588	182	118	158
ABSOL EOSINO	1794		236-6844	6734	2778	6478
ABSOL MONO	828		236-4012			79
THROMBOCYTES						
LYM/HET RATIO	7.0		4-13	AD:R	NOA	

MAKAI ANIMAL HOSPITAL
420 ULUNIU ST.
KAILUA, HI 96734

IDEXX VETERINARY SERVICES
Online results at www.vetconnect.com
West Region 800-444-4210
East/Central/Colorado 888-433-9987

1-808-262-9621 ACCOUNT #: 1303

PATIENT: NMES, SAM

REQ #: 4059954 LAB #: L0495651
AGE: SEX: COLLECTED: 03/20/2003
SPECIES: REPTILE RECEIVED: 03/21/2003 07:01
BREED: GREEN SEA TUR REPORTED: 03/21/2003 09:54

DOCTOR: MORRIS

TEST PROCEDURES	RESULTS	REFERENCE RANGE	UNITS
REPTILIAN PROFILE #1			
REPTILIAN PANEL #1			
ALK. PHOSPHATASE	157		IU/L
ALT (SGPT)	27		IU/L
AST (SGOT)	935		IU/L
CK	348		IU/L
LDH	101		IU/L
ALBUMIN	0.9		g/dL
TOTAL PROTEIN	3.2		g/dL
GLOBULIN	2.3		g/dL
BUN	15		mg/dL
CREATININE	0.3		mg/dL
CHOLESTEROL	235		mg/dL
GLUCOSE	85		mg/dL
CALCIUM	8.7		mg/dL
PHOSPHORUS	4.8		mg/dL
POTASSIUM	4.7		mEq/L
SODIUM	151		mEq/L
A/G RATIO	0.4		
URIC ACID	0.8		mg/dL
AVIAN/EXOTIC CBC AND PLASMA PROTEIN			
WBC-EST	6-8		THOUS.
WBC COUNT	7.9		THOUS.
HCT	30.0		%
HETEROPHILS	15		%
NEUTROPHIL SEG	2		%
LYMPHOCYTES	82		%
EOSINOPHIL	1		%
ABSOLUTE HETEROPHIL	1185		/uL
ABSOLUTE NEUTROPHIL SEG	158		/uL
ABSOLUTE LYMPHOCYTE	6478		/uL
ABSOLUTE EOSINOPHIL	79		/uL
THROMBOCYTES	ADEQUATE		

NMES, SAM

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DOCTOR: MORRIS

TEST PROCEDURES

BLOOD PARASITES

NO PARASITES SEEN

REMARKS

FEW REACTIVE LYMPHS PRESENT
RBC MORPHOLOGY APPEARS NORMAL.
NEUTROPHIL SEG = AZUROPHILS

RESULTS

REFERENCE RANGE UNITS

NMES, SAM

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IDEXX VETERINARY SERVICES
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West Region 800-444-4210
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1-808-262-9621 ACCOUNT #: 1303

PATIENT: NMES, ALBERT

REQ #: 4059955
AGE: SEX:
SPECIES: REPTILE
BREED: GREEN SEA TURTLE

LAB #: L0495688
COLLECTED: 03/20/2003
RECEIVED: 03/21/2003 07:01
REPORTED: 03/21/2003 09:54

DOCTOR: MOORIS

TEST PROCEDURES

REPTILIAN PROFILE #1

REPTILIAN PANEL #1

ALK. PHOSPHATASE

ALT (SGPT)

AST (SGOT)

CK

LDH

ALBUMIN

TOTAL PROTEIN

GLOBULIN

BUN

CREATININE

CHOLESTEROL

GLUCOSE

CALCIUM

PHOSPHORUS

POTASSIUM

SODIUM

A/G RATIO

URIC ACID

AVIAN/EXOTIC CBC AND PLASMA PROTEIN

WBC-EST

WBC COUNT

HCT

HETEROPHILS

NEUTROPHIL SEG

LYMPHOCYTES

ABSOLUTE HETEROPHIL

ABSOLUTE NEUTROPHIL SEG

ABSOLUTE LYMPHOCYTE

THROMBOCYTES

BLOOD PARASITES

NO PARASITES SEEN

RESULTS

REFERENCE RANGE UNITS

77

5

298

507

60

1.3

3.6

2.3

21

0.3

163

93

9.5

5.5

5.8

158

0.6

0.7

9-11

9.1

31.0

24

2

74

2184

182

6734

ADEQUATE

IU/L

IU/L

IU/L

IU/L

IU/L

g/dL

g/dL

g/dL

mg/dL

mg/dL

mg/dL

mg/dL

mg/dL

mg/dL

mEq/L

mEq/L

mg/dL

THOUS.

THOUS.

%

%

%

%

/uL

/uL

/uL

NMES, ALBERT

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1-808-262-9621 ACCOUNT #: 1303

PATIENT: NMES,ALBERT

REQ #: 4059955
AGE: SEX:
SPECIES: REPTILE
BREED: GREEN SEA TUT

LAB #: L0495688
COLLECTED: 03/20/2003
RECEIVED: 03/21/2003 07:01
REPORTED: 03/21/2003 09:54

DOCTOR: MOORIS
TEST PROCEDURES
REMARKS

RESULTS

REFERENCE RANGE UNITS

CELLS DO NOT APPEAR TOXIC OR REACTIVE
RBC MORPHOLOGY APPEARS NORMAL.
NEUTROPHIL SEG = AZUROPHILS

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IDEXX VETERINARY SERVICES
Online results at www.vetconnect.com
West Region 800-444-4210
East/Central/Colorado 888-433-9987

1-808-262-9621 ACCOUNT #: 1303

PATIENT: HMES, YUNIS

REQ #: 4059953
AGE: SEX:
SPECIES: REPTILE
BREED: GREEN SEAT

LAB #: L0495697
COLLECTED: 03/20/2003
RECEIVED: 03/21/2003 07:00
REPORTED: 03/21/2003 09:54

DOCTOR: MORRIS

TEST PROCEDURES

REPTILIAN PROFILE #1

REPTILIAN PANEL #1

	RESULTS	REFERENCE RANGE	UNITS
ALK. PHOSPHATASE	71		IU/L
ALT (SGPT)	9		IU/L
AST (SGOT)	309		IU/L
CK	809		IU/L
LDH	164		IU/L
ALBUMIN	1.2		g/dL
TOTAL PROTEIN	5.0		g/dL
GLOBULIN	3.8		g/dL
BUN	19		mg/dL
CREATININE	0.3		mg/dL
CHOLESTEROL	297		mg/dL
GLUCOSE	60		mg/dL
CALCIUM	6.7		mg/dL
PHOSPHORUS	8.1		mg/dL
POTASSIUM	4.5		mEq/L
SODIUM	152		mEq/L
A/G RATIO	0.3		
URIC ACID	2.4		mg/dL

AVIAN/EXOTIC CBC AND PLASMA PROTEIN

WBC COUNT	5.9		THOUS.
HCT	21.0		%
HETEROPHILS	56		%
NEUTROPHIL SEG	2		%
LYMPHOCYTES	42		%
ABSOLUTE HETEROPHIL	3304		/uL
ABSOLUTE NEUTROPHIL SEG	118		/uL
ABSOLUTE LYMPHOCYTE	2478		/uL
THROMBOCYTES	ADEQUATE		

BLOOD PARASITES

NO PARASITES SEEN

REMARKS

HMES, YUNIS

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Online results at www.vetconnect.com
West Region 800-444-4210
East/Central/Colorado 888-433-9987

1-808-262-9621 ACCOUNT #: 1303

PATIENT: HMES, YUNIS

REQ #: 4059953
AGE: SEX:
SPECIES: REPTILE
BREED: GREEN SEAT

LAB #: L0495697
COLLECTED: 03/20/2003
RECEIVED: 03/21/2003 07:00
REPORTED: 03/21/2003 09:54

DOCTOR: MORRIS

TEST PROCEDURES

RESULTS

REFERENCE RANGE UNITS

CELLS DO NOT APPEAR TOXIC OR REACTIVE

RBC MORPHOLOGY APPEARS NORMAL.

DIFFERENTIAL MAY BE AFFECTED DUE TO MANY SMUDGE CELLS PRESENT.

NEUTROPHIL SEG = AZUROPHILS

HMES, YUNIS

*** FINAL REPORT ***

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~~12350#~~
~~3-18-03~~

other lower half Chong Pond

Captive turtle
Private Pond

DATE FORM FILLED OUT 3-18-03 SLIM HOLT POND

CAPTURE DATE, LOCATION AND METHOD: *in the name of*

3-18-03 Kapoho Albert 1030-1130am
resday

PERSON RECORDING DATA: Jilly Q

Marine Turtle Research
NMFS HONOLULU LAB
2570 Dole Street
Honolulu, HI 96822-2396
NEW TAGS

HAND

TUMOR SCORE

0

OLD TAGS:

None

ORAL TMRS EXT:
YES OR NO

Yes

EMACIATION CODE

0

GH
RH
4454683F27
LH
RH
44397A5D7A

cm

STRAIGHT CARAPACE - LENGTH:

63.9 cm

WIDTH: 51.8 cm

cm

NOTCH LENGTH:

63.9 cm

DB: 0 L.O.

VB: 0 L.O.

cm

CURVED CARAPACE LENGTH:

66.5 cm

WIDTH: 57.0 cm

cm

HEAD WIDTH:

10.2 cm

AXIAL: 26.8 cm

LATERAL: 26.8 cm

PPS: YES OR NO OR NE

no

SEX: Male, Female or Undetermined

M

TAIL LENGTH: T

35 cm

C 25.5 cm

SAMPLES COLLECTED:

cm

RIGHT FRONT FLIPPER WIDTH:

14.0 cm

Hood glucose from neck

PLASTRON LENGTH:

52.4 cm

GB 74, 74

WEIGHT:

104 lbs #
59 45

MR 84

Blood for biochem and banking

DESCRIPTIVE REMARKS:

Soft round area 19cm diameter centered on horizontal seam

photo "AL" L+R 2nd cat

DATE FORM FILLED OUT

Capture date 2003

Rowley Pond

CAPTURE DATE, LOCATION AND METHOD:

Tuesday "ARTHURENA" 3/18/03 ^{new} KAPOHO formerly Makaweo family

PERSON RECORDING DATA: Jill Q

Marine Turtle Research
NMFS HONOLULU LAB
2570 Dole Street
Honolulu, HI 96822-2396

FAMILY

TUMOR SCORE

0

OLD TAGS

RA

Y-159

All still attached time

ORAL TMRS EXT. YES OR NO

NO

RFL

Y-157

CFL

Y-158

NEW TAGS:

4452200535



EMACIATION CODE

0

STRAIGHT CARAPACE - LENGTH:

84.3 cm

WIDTH: 60.38 cm

NOTCH LENGTH: 84.2 cm

DB: 0 L.O.

VB: 0 L.O.

CURVED CARAPACE LENGTH:

89.0 cm

WIDTH: 78.5 cm

HEAD WIDTH: 12.3 cm

AXIAL: 35.3 cm

LATERAL: 30.1 cm

PPS: YES OR NO OR NE Yes

SEX: Male, Female or Undetermined F

TAIL LENGTH: T 24 cm

C 18.5 cm

RIGHT FRONT FLIPPER WIDTH:

14.4 cm

SAMPLES COLLECTED:

PLASTRON LENGTH: 29.4 cm

WEIGHT: — #

Blood for Biochem and BTKing

DESCRIPTIVE REMARKS:

Arthurena

DATE FORM FILLED OUT / /

69

CAPTURE DATE, LOCATION AND METHOD:

3/19/03

wednesday

Alice Drew
Turtle named "SAM" at Peggy Foreges Pond

PERSON RECORDING DATA:

Marine Turtle Research
NMFS HONOLULU LAB
2570 Dole Street
Honolulu, HI 96822-2396

NEW TAGS:

TUMOR SCORE

0

OLD TAGS:

N479

ORAL TMRS EXT.
YES OR NO

no

EMACIATION CODE

0

RFL

LF

STRAIGHT CARAPACE - LENGTH:

69.4 cm

WIDTH: 52.4 cm

NOTCH LENGTH: 69.4 cm

DB: 0 L.O.

VB: 0 L.O.

CURVED CARAPACE LENGTH:

73.0 cm

WIDTH: 61.0 cm

HEAD WIDTH: 10.7 cm

AXIAL: 29.0 cm

LATERAL: 28.9 cm

PPS: YES OR NO OR NE Y

SEX: Male, Female or Undetermined M

TAIL LENGTH: T 35.5 cm

C 25 cm

RIGHT FRONT FLIPPER WIDTH:

13.2 cm

SAMPLES COLLECTED:

PLASTRON LENGTH: 51.4 cm

glucose

B-76

WEIGHT: 126 #

R-89

for Biochem and plasma
3 Tubes of blood

DESCRIPTIVE REMARKS: no tumors

→ RH Flipper, likely tag loss R Eye posterior slight bulge

NATIONAL WILDLIFE HEALTH CENTER
NECROPSY REPORT

Submitter's Name, Affiliation Address

Mr. George Balazs
NOAA-NMFS-SWFC
2570 Dole Street
Honolulu, HI 96822-2396

Case: 15297
Accession: 001
Collected: 02/11/2000
Exam Date: 04/03/2000
Pathologist: T.M. Work
Prosector: T.M. Work

Species: Green turtle Specimen: Carcass
Bandtype: (E) Ref/Band No: (021100D) Euth: (N) Weight (Gm): (94545)
History Summary: This animal was found dead in an isolated saltwater pond near Kapoho on Hawaii. The animal was fed papayas and other fruit due to the lack of opportunities to graze on algae. Identification tags: RFL-Y153, LFL-Y152. Body measurements: SCL-80.2 cm, CCL-83.5 cm, TTL-38.5 cm.

EXTERNAL/INTERNAL OBSERVATIONS - LABORATORY RESULTS

External: The carcass was frozen prior to necropsy.

Internal: There are massive amounts of body fat. The liver is gray, cirrhotic, and appears shrunken. Pale foci ranging from pinpoint size to 1 mm appear on the liver surface. The heart is firm, smooth, homogenous red and otherwise unremarkable. The lungs are spongy and homogenous red-pink. The spleen is firm, smooth, and homogenous brown. The kidneys are firm, smooth, and homogenous brown. The adrenals appear enlarged. No bladder trematodes were seen. There is a huge amount of mesenteric fat. The thyroid is markedly hypertrophied and measures 11 cm in diameter. The brain is smooth, firm, and homogenous tan-pink. The esophagus contains the remains of 3-4 papayas. The gastrointestinal mucosa is smooth, homogenous tan and the lumen of the small intestines contains remains of papayas. No lesions are seen in the brain, musculoskeletal system, pericardial sac, heart valves, gall bladder, gastrointestinal mucosa and serosa, testes, pancreas and superficial and cut surface of heart, kidney, spleen, and lungs.

Preliminary Diagnosis: Goiter Exam Type: (GO)

Sex (M) Age (B)/() Body Cond. (E) Postmortem State (G) Giz. Lead ()/()

Laboratory Tests/Samples Saved:

1. Histo: Brain (A); Liver, spleen, testes (B); heart (C); lung (D); thyroid (E); liver (F); kidney (G-H).
2. Frozen: spleen, liver, thyroid.

HISTOPATHOLOGY:

Lung: In one section, the pleura appear somewhat thickened with nidi of eosinophilic homogenous material.

Liver: Diffusely, hepatic architecture is largely replaced by trabeculae of fibrous tissue surrounding pleomorphic clear spaces (probable fatty change) some of which are filled with masses of melanophages. Isolated foci of massively atrophied hepatocytes are occasionally noted within connective tissue trabeculae.

Heart: Myocardial fibers appear alternatively shrunken to hypertrophied and there are numerous small infiltrates of melanophages. In one section, myocardium is displaced by large numbers of lipocytes.

Brain: There is marked deposition of fibrillar eosinophilic material around meningeal blood vessels. Some vessels within the brain contain intramural depositions of granular brown pigment.

Histopathology (cont.)

Spleen: The spleen is virtually bereft of lymphoid tissue and red cells most of which are replaced by massive deposition of granular brown pigments and vacuolated cells. The latter are hard to positively identify as lipocytes due to freeze-thaw damage. The splenic capsule appears thickened and there are focal areas of necrosis and deposition of basophilic granular pigment (probable mineralization).

Kidney: There is marked fatty change and fibrosis of renal tubular interstitium that occupies most of the renal architecture. Remnant proximal tubular cells are either massively atrophied or exhibit acute necrosis characterized by cytoplasmic hypereosinophilia, fragmentation and nuclear pyknosis and karyolysis. Accumulations of birefringent crystals are noted within the lumen of scattered tubules. Epithelium of bowmans capsule of glomeruli appears hypertrophied and glomeruli are infiltrated by moderate numbers of melanophages.

Thyroid: Some follicles are massively distended with colloid and lined by flattened epithelium. Focally, there are marked infiltrates of melanophages within smaller follicles.

Testes: There is marked diffuse atrophy of spermatocytes and seminiferous tubule cells. Seminiferous tubules are surrounded by a markedly thickened connective tissue/fibroblasts layer and are separated by massive numbers of lipocytes.

Morphologic Diagnoses:

- 1) Severe goiter.
- 2) Severity, diffuse, chronic, fatty change, fibrosis, and atrophy, liver, kidney, testes.
- 3) Severe, multifocal, necrosis with crystals, proximal tubules, kidney
- 4) Severe, diffuse, lymphoid depletion and fatty change, spleen.

Comments: The lesions in this animal pointed to a metabolic disease associated with inability to properly mobilize and metabolize fat. This was evident in the changes (fatty change) seen in multiple organs. The fibrosis accompanying these changes indicated the process was chronic (occurring over several months and perhaps years) and eventually impaired function of critical organs (spleen, liver, kidney) to the point where the animal died. It is likely that a major source of this metabolic disorder was severe hypothyroidism manifested morphologically as a massively enlarged thyroid (goiter). Goiter is typically associated with a diet deficient in iodine. Sea turtles in the wild typically graze on a variety of marine algae, which are rich sources of iodine, and probably other critical nutrients. The diet (papayas and other fruit and vegetables and absence of marine algae) of this animal may have lacked sufficient iodine. Alternatively, this animal may have been unable, for unknown reason, to properly assimilate iodine from its diet. The crystals in seen in the kidney were compatible with oxalate. Deposition of these crystals in animals typically occurs when they eat antifreeze (ethylene glycol) or plants rich in oxalates. These crystals, in sufficient amounts, damage kidney tissue and may lead to renal failure.

Final Diagnosis (in order of importance)

	topog.	morph.	etiol.	funct.	disease	link
1. <u>Hypothyroidism</u>	(T96000)	(M71000)	()	()	()	()
2. _____	()	()	()	()	()	()
3. _____	()	()	()	()	()	()

Diagnostic findings may not be used for publication without the pathologist's knowledge and consent. COD (16)