

# Emys Conservation

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## *Lettre n°25*

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**Chers collègues et amis,**

De tristes nouvelles tout d'abord, à peine le temps de faire connaissance et d'apprécier Hans-Dieter Philippen, à Kiten au 5<sup>ème</sup> Symposium Emys, que l'annonce de son décès le 8 avril dernier vient tous, nous endeuiller. Il fut l'un des plus efficaces négociateurs et rédacteurs du protocole de Kiten.



*Wenn Du an mich denkst, erinnere Dich an die Stunde,  
in welcher Du mich am liebsten hattest*

**Hans - Dieter Philippen \*11.06.1957 †08.05.2016**

*Es gibt Menschen in der Welt, welche die Gabe haben, überall Freunde zu finden.  
Dein plötzlicher Tod lässt uns fassungslos zurück und wir sind dankbar  
Heinsberg-Schafhausen, im Mai 2016*

Deux articles importants dans cette lettre celui de Donato Ballasina, dont c'est une sorte de retour à la « Vie Tortue » et celui de Mélita Vamberger et Uwe Fritz. Le premier est une observation de comportement maternel chez *Chelydra serpentina* voire la reconnaissance de la mort d'un nouveau-né. Le second pose la question de la capacité de *Mauremys rivulata* à de longs séjours en mer Egée, donc de leur capacité de colonisation...

Quelques photos et informations « cistudes et apparentées », bonne lecture !

Alain Veysset, rédacteur

Dear Colleagues and Friends,

One more tragic death, this really bad new from Bulgaria:

"Dear all:

I still can not believe this has happened... and I am out of words...

On June 22 **Andrey Stoyanov, Nikolay Tzankov, and Dobrin Dobrev**, three amazing friends and people, devout fathers, renowned colleagues, stellar herpetologists, teachers, conservationists, and so much much much more left us for good after a tragic car accident in Greece...

All Bulgarian herpetologists, colleagues, friends, families are in shock and disbelief...

For those who knew them, please, keep them in your memory...

and, please, pass along anybody that I have missed and might be interested...

Yurii"

--

You received this message because you are subscribed to the Google Groups "European Freshwater Turtles Group".

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For more options, visit <https://groups.google.com/d/optout>.

Our deepest sympathy is for the families and for our German and Bulgarian friends and colleagues.

Two important articles in this letter those one of Donato Ballasina which is a sort of come back to "Turtle Life" and the article of Mélita Vamberger and Uwe Fritz. The first one is an observation on possible maternal behavior of *Chelydra serpentina* and even the possible recognition of the death of a newborn... The second asks the question of the capacity of *Mauremys rivulata* to stay long times in Aegean Sea and so their capacity to colonize...

Some photos and information "Emys and more", enjoy reading !

Alain Veysset, editor

### KITEN PROTOCOL

Experts on the study and protection of freshwater turtle and tortoise species and representatives from different European countries gathered at the 5<sup>th</sup> International Symposium on *Emys orbicularis* held in Kiten (Bulgaria) from the 19<sup>th</sup> to the 21<sup>st</sup> of August 2015,

*Concerned* by the overall increase in the illegal trafficking of native animal species in Europe and in particular by the mass illegal cross-border trafficking of turtles;

*Conscious* that the distribution area and population density of the five continental species of turtles native to Europe have reduced dramatically in recent decades;

*Aware* that the proper and quick release of seized animals can save many turtle lives and restore wild populations;

*Recognizing* that the principle of state sovereignty over its territory and over the species that live in it should not be an obstacle to achieving full and effective international cooperation;

*Recognizing* the efforts that the authorities of European countries have undertaken in recent years to protect wildlife by law and the acceptance of international agreements;

*Recognizing* that the delicate situation that European turtles are in requires the widest possible cooperation among all countries and their participation in providing an adequate and effective internal and international response;

**They agree** to recommend to the authorities of the European countries to follow the measures listed below in the event of a massive turtle confiscation:

*Always bear in mind* article VIII (Measures to be taken by the Parties) of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) that establishes what should be done once the animals have been seized, although there are additional highly recommended actions to carry out in the same sense as the aforementioned article VIII of CITES:

- *Establish* the precise locality of origin of the confiscated animals through a rapid police investigation.
- At the same time, *carry out* genetic analysis of the turtles to determine their origin.
- *Complete* a thorough check of the animals to facilitate their handling, keeping them in separate groups to avoid stress and spread of diseases.
- *Encourage* a rapid release of the turtles at their place of origin, once the exact locality has been ascertained and the health of each animal verified.

These recommended measures shall be accompanied along other actions:

- Acceptance of economic costs by the authorities based on realistic budgeting.
- Intensify control over the trafficking of protected species, including through the use of the Internet.
- Increase coordination among different state agencies and between different authorities from different countries in order to rapidly locate and repatriate confiscated animals.
- Increase coordination with turtle specialists for scientific and logistic support.
- Encourage the creation of Rescue Centres recognized as collaborative CITES Centres with the aim of keeping animals for fixed periods of time, assessing their health and finally releasing them into their original habitat.

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Joan Budó (Spain) - C.R.T. l'Albera (Turtle & Tortoise Recovery Center)  
Sergey Drobenkov (Belarus) - National Academy of Sciences of Belarus  
Uwe Fritz (Germany) - Senckenberg Dresden (Natural History Collections)  
Marc Girondot (France) - Centre National de la Recherche Scientifique, Paris  
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Les carapaces rouges ne sont pas toujours synonymes de Mario Kart. Et dans le cas de la petite **tortue léopard (*Stigmochelys pardalis*, Bell, 1828)** Cleopatra, il est surtout question de se soigner. Sauvée par la **Nico Novelli**, l'association de protection des reptiles de **Canyon Critters** dans le Colorado, **Cleopatra** souffrait de malnutrition qui lui a causé plusieurs problèmes au niveau de sa carapace. Certaines parties de sa coquille formaient des pyramides risquant de blesser ses congénères tandis que d'autres étaient trouées, ce qui pouvait engendrer des infections plus graves.

Afin de l'aider dans son quotidien, un étudiant de l'université du Colorado a décidé de lui développer une nouvelle carapace de protection, intégralement **imprimée en 3D**. Après 600 heures de travail sur un logiciel afin de créer un dôme qui pourrait s'adapter parfaitement à la tortue, la carapace a été « imprimée » à l'aide d'un **plastique biodégradable** conçu à base de blé, qu'elle devra la conserver le temps que ses blessures guérissent.

Le créateur de la coquille explique sa fierté dans le [Denver Post](#) : « *C'est fantastique de savoir que cette tortue va être capable de se remettre de sa malnutrition* ». Il faut dire que l'impression 3D est de plus en plus utilisée pour aider des animaux mutilés. On se souvient notamment du canard dont le bec a été reconstitué à l'aide d'une imprimante 3D ou encore d'une prothèse pour un chien dont les pattes avant souffraient de malformation.

Freddy, une tortue brésilienne, (la « tortue charbonnière », *Chelonoidis carbonaria*, Spix, 1824) est la première de son espèce à survivre grâce à une carapace intégralement reproduite à l'aide d'une imprimante 3D.

Freddy la tortue a bien failli de jamais sortir vivante du feu de forêt qui a ravagé son habitat naturel, au Brésil. Elle y a d'ailleurs laissé sa carapace, qui a brûlé dans sa quasi-totalité.

Lorsqu'elle a été retrouvée, Freddy n'avait que de minces chances de survivre, la carapace d'une tortue étant vitale. Mais [The Animal Avengers](#), une association de défense des animaux représentée à Sao Paulo par quatre vétérinaires, un chirurgien-dentiste et un designer 3D, était bien décidée à lui laisser une chance de poursuivre sa paisible existence.



Ils ont ainsi décidé de lui fabriquer une prothèse en utilisant l'impression 3D. "Freddy est la première tortue au monde à avoir reçu une carapace entièrement recréée artificiellement et le premier animal que nous avons souhaité aider", a raconté au [Daily Mail](#) le designer de cette cellule locale de l'association, Cicero Moraes.







Après avoir modelé sa structure en observant des photographies de tortues de la même espèce et confié l'impression en matériau concret au dentiste du groupe, Freddy a pu retrouver sur son dos sa petite maison. Un artiste a même reproduit au pinceau l'aspect des écailles.



Cette équipe de chirurgiens-vétérinaires nouvelle génération a depuis déjà reconstruit, grâce à la 3D, le bec d'un toucan, d'un perroquet et d'une oie. Elle est aussi à l'origine de la toute première greffe de bec en titane pour un ara du Brésil.



# Mother care in North American Snapping turtle (*Chelydra serpentina*) : observations and experiments.

P9

by

**D. Ballasina**

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## Introduction

Several adult Snapping turtles (*Chelydra serpentina*) were rescued as abandoned or errating specimens in several European countries, and hosted by the International RANA herpetological Institute in its turtle rescue facility, CARAPAX, in Italy. (Ballasina, 1995).

Although sexes were separated at arrival, several adult females nevertheless laid eggs, which were usually removed and destroyed, as Snapping turtles are considered as a dangerous invasive species, especially in Southern Europe, some females manage in hiding very well their nests (Zappalorti 1976, Ernst et al. 1994), which gave birth to hatchlings. (between 12 and 22 hatchlings per nest, according to Buhlman et al, 2008, Carr 1952, Pritchard 1979).

Most adult Snapping turtles were kept in black artificial ponds, sponsored by leading manufacturer UBBINK from Belgium and Holland. The type of ponds, which we used at the CARAPAX turtle facility, measured some 2 x 3 meter, with an average depth of 60 cm. About 5 to 7 adult or subadult Snapping turtles were kept together. The feeding consisted in various pellets, dead chicks, and fresh fishes of all kind. Sometimes they managed to capture a passing green frog (*Pelophylax bergeri*).

## First observations

At 2 occasions baby Snapping turtles hatched, went to the water and got drowned, because they weren't able to get out of the pond with its vertical steep and slippery edges.

We were surprised to see that the hatchlings were not eaten, nor by the mother, neither by other adult specimens. Their little corpses continued to float undamaged and when starting to rot, they were removed by the CARAPAX personnel.

Moreover surviving tiny hatchlings used their mothers' carapace as a living "boat" for transport, or to bask. Recently CARAPAX received 22 unforeseen hatchlings of *Chelydra serpentina* from the colleagues of CRT, Centro de Reproduccio de Tortugues, from Garriguella, Catalonia, Spain.

## Experiments

As former observations might be interpreted as just happening by chance, we decided to try by experiment, first with dead hatchlings, than with living ones. We used for this experiment adult females which didn't have laid eggs. Surprisingly the 2 females were immediately attracted by the presence of these hatchlings, but none of them tried to bite or to swallow the young, as hungry snappers usually do. Once again some baby snappers climbed on the surrogate mothers' shell.

Dead hatchlings were left some 2 hours in the water, but none of them were touched by the adults.

After removal of the dead and living hatchlings, a dead mouse was presented to both snappers. Astonishingly both moved carefully towards the mouse inspected it for a while without attacking and swallowing it as they usually do immediately. It seemed as if they wanted to be sure this wasn't a baby snapper. After this long inspection (15 minutes), the dead mouse was eaten.

## Conclusion

We may conclude that **mother care, and even more generally care of hatchlings exists in North American Snapping turtles in a similar way as is observed in Crocodylidae and Alligatoridae** (Zappalorti). Maybe the first observations were a case of chance, but with the set up of an experiment, as described, the conclusion was quite clear.

## Aknowledgements

The author wants to thank all volunteers who took care of the Snapping turtles, by rescuing them and taking care for them for many years, especially Ettore Degli Esposti, from Italy's national animal Rescue organisation ENPA, Antonio Nania, from WWF Italy, and Bob Luyendijk, from the Dutch Turtle Foundation.

Many thanks to the UBBINK company, for sponsoring CARAPAX for many years, with dozens of ponds and pond technologies.

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Two baby snappers on their mother's carapace



Mother snapper inspecting dead hatchling in front of her mouth without eating it.

**Freshwater turtle (*Mauremys rivulata*) crosses the Aegean Sea-Turtle Found in Eastern Mediterranean, from southeast Europe and Greece to western Turkey and as far as Lebanon, Israel, Syria and the islands of Crete and Cyprus.** p11

Date: April 7, 2014

Source: Senckenberg Research Institute and Natural History Museum

Scientists at the Senckenberg Research Institute in Dresden, together with an international team of researchers, have studied the widely distributed freshwater turtle, *Mauremys rivulata*. In spite of geographical barriers, the turtles are genetically very similar throughout their vast distribution range. This would indicate that that animals cross hundreds of kilometres of sea. The study is published in the scientific journal *Zoologica Scripta*.

*Mauremys rivulata* is a turtle, no more than 24 centimetres in size, which is widely distributed in lakes and streams in the region of the Eastern Mediterranean, from southeast Europe and Greece to western Turkey and as far as Lebanon, Israel, Syria and the islands of Crete and Cyprus.

The wide range of the species led the research team of Prof Dr Uwe Fritz, Managing Director at Senckenberg Dresden to study this species of turtle genetically.

"Because of the many geographical barriers in the range of this freshwater turtle -- especially the Aegean Sea -- we assumed that there would be many genetically different populations. This was based on the consideration that there was no gene flow between the isolated distribution patches, as the sea divides the populations," says Fritz.

The story that emerged, however, was quite a different one: Using different genetic methods, the scientists examined 340 turtle samples from a total of 63 localities across the entire region of distribution. "The astonishing thing is that even turtles living at great distances from each other display an almost identical genetic pattern, for instance, in southeast Europe and Asian Turkey" explains Fritz. This means that the turtles must have found a means to exchange their genes across large distances -- and indeed over hundreds of kilometres of sea.

But how do the animals manage to live on both sides of the Aegean without developing into an individual species over time? "One idea is that the turtles were brought to the different regions by humans, which meant that the gene pool could mix constantly," explains Melita Vamberger, lead author of the study, and adds: "Yet in contrast to other turtles, *Mauremys rivulata* was never popular as food, because these animals stink terribly. There is therefore no obvious reason why these turtles should have been transported in such large numbers."

Thus, only one other -- unexpected -- possibility remained for the researchers: "We assume that this freshwater turtle is dispersed across the sea. It is likely that turtles are swept repeatedly from their habitats in coastal swamps into the sea by storms. They can obviously survive for a long time in the sea, long enough until they are washed onto some shoreline somewhere. And this occasional exchange is sufficient!"

In fact, some time ago a *Mauremys rivulata* was caught on open water near Cyprus, which would support this theory.

And whatever a turtle can do might also be a feasible option for others. "It might well be possible," says Fritz, "that other turtle species take the route across the sea. For instance, this could also explain the weak genetic structure found throughout the widely distributed and endangered North American diamond terrapin (*Malaclemys terrapin*)." This could necessitate rethinking conservation measures for this and other species.

Story Source:

The above post is reprinted from [materials](#) provided by [Senckenberg Research Institute and Natural History Museum](#). Note: Materials may be edited for content and length.

Journal Reference:

1. Melita Vamberger, Heiko Stuckas, Dinçer Ayaz, Petros Lymberakis, Pavel Široký, Uwe Fritz. Massive transoceanic gene flow in a freshwater turtle (Testudines: Geoemydidae: *Mauremys rivulata*). *Zoologica Scripta*, 2014; DOI: [10.1111/zsc.12055](https://doi.org/10.1111/zsc.12055)

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Posted By: David DMar, 2/28/2016 [NewHistorian.com](http://NewHistorian.com)

An archaeological site in the southeastern region of Turkey dating back to the Iron Age has yielded surprising results - a human grave adorned with several turtles.

The site, located on the south bank of the Tigris River just a stone's throw from the town of Bismil, is known as Kavusan Höyük. The multi-period site has yielded treasures in the past dating from as early as the third millennium BCE to the Middle Ages, but the Iron Age grave site - dated to around 2,500 years old - is unique for the inclusion of a number of Euphrates softshell turtles that seem to have been butchered specifically for inclusion with the two sets of remains found alongside.

Laid to rest within the grave among the turtles were, judging from preliminary study of their skeletons, a middle-aged woman of anywhere between 45 and 55 years of age and a child, 6 to 7 years old, of undetermined sex. The woman had been interred first followed very shortly thereafter by the child, based on the lack of any disturbance of the former's remains; the latter, which was posed with its left leg bent and its left arm stretched up across its shoulder to shield its face, is thought to have been a female based on the an broken Iron Age brooch known as a fibula that had been buried with the child as a grave good.

With a woman and child buried together in the same grave, it may be natural to assume some sort of kinship between them - possibly even mother and daughter. However, the pair of remains has yet to be subjected to DNA analysis, making it impossible to make any sort of determination as yet. Neither set of remains bore any evidence of suffering fatal trauma.

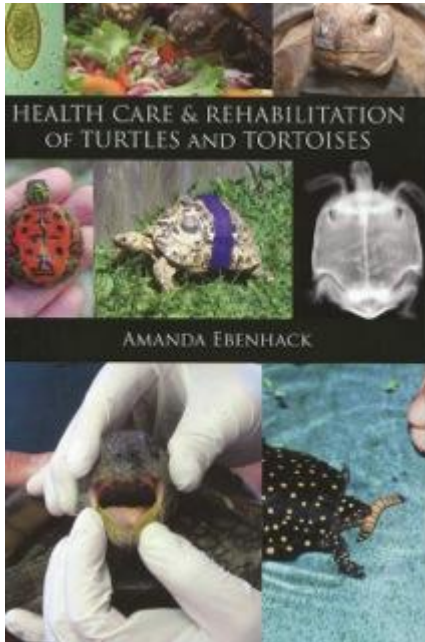
The remains of more than 20 turtles were found to have been positioned in a ring around the edge of the burial pit. Additionally, the shells of two turtles, plus a number of bones, were found to have been scattered in the center of the gravesite; one of central turtle shells was from a spur-thighed tortoise. Additionally, three of the turtles were found to have been Middle Eastern terrapins, a common species to find in eastern Turkey; the remaining 17 were the Euphrates turtles, a species noted as being highly aggressive. Finding both the Middle Eastern terrapins and Euphrates turtles being used as grave goods was called "unprecedented" by the researchers involved in the archaeological site, according to an article appearing in Discovery News.

Euphrates softshell turtles, a carnivorous species that are not above scavenging from carcasses, have been known to feed on the bodies of animals as large as horses adrift in bodies of water. The significance of their use to embellish the gravesite is yet to be discerned.

\$39.95 plus \$6.00 S&H

Soft cover, Pages 393

By Amanda Ebenhack



Turtles and tortoises have been around for over 250 million years. In recent times, turtles and tortoises have been hardy and interesting family pets. These prehistoric beauties are worthy of our respect, both in captivity and in nature, particularly as it pertains to proper care, feeding, and especially when they require medical treatment. Most incidents causing the demise of these wonderful creatures in nature result from human interference. As urban sprawl encroaches on their natural habitats they are forced into streets and they come into contact with mowing equipment, agricultural equipment, and recreational vehicles, both on the road and on the water. Many are hit by automobiles, chewed on by dogs, and run over by mowers. Although some injuries may appear fatal, turtles and tortoises have amazing abilities to heal in addition to an incredible will to survive. Many times, injured turtles and tortoises end up in the hands of rescuers who do not understand their amazing healing abilities. To an inexperienced eye many shell fractures and injuries look fatal when they are not. Many veterinarians not experienced with chelonians may euthanize an animal without even attempting rehabilitation. In addition to a wealth of information on anatomy, captive care, diet and nutrition, and indoor and outdoor enclosure design, this book is intended to help with the medical care of injured turtles and tortoises. Also included is general first aid and supportive care for most afflictions that can befall turtles both in nature and in captivity. This exciting and informative book features the most current information on hydration, tube feeding, shell fractures and wound care, shell conditions, bacterial and viral diseases, respiratory illness, parasites, and guidelines for checking for overall wellness of injured or recovering turtles and tortoises.

**Custom officials seize 146 tortoises at Mumbai Airport**

ANI Updated Mar 20, 2016, 7:11 pm IST

The bag was said to belong to a transit passenger, who arrived from Madagascar and flew to Kathmandu leaving this bag behind. Two radiated tortoises were found dead with broken shell .  
(Photo: Twitter)

Mumbai: The Custom officials on Sunday seized 146 tortoises from a mishandled baggage of a Nepal citizen at the Mumbai airport. The incident happened when the Jet Airways staff brought one left behind baggage to officers of Air Intelligence Unit (AIU), saying that some suspicious images (shell like) had been noticed by GVK Security.

The bag was said to belong to a transit passenger, who arrived from Madagascar and flew to Kathmandu leaving this bag behind. Officers of Air Intelligence Unit examined the bag and recovered and seized 146 tortoises.

Out of the 146 tortoises, 139 were Radiated tortoises (*Astrochelys radiata*) and seven were Angonoka tortoises (*Astrochelys yniphora*), both critically endangered tortoise species of Madagascar. Two radiated tortoises were found dead with broken shell.

Since these were exotic species and cannot be introduced into India and because of quarantine reasons, as informed by wild life authorities, the airlines have been instructed to re-export the same to Madagascar under intimation to wildlife authorities there.

<http://www.deccanchronicle.com/nation/current-affairs/200316/custom-officials-seize-146-tortoises-at-mumbai-airport.html>

**Rare Madagascan tortoises missing from breeding station**

June, 7 2016 at 12:12 3,690

The Natural Resources and Environment Ministry has set up a committee to investigate the disappearance of the 78 missing tortoises, Thairath Online reported. Adisorn Noochdumrong, deputy director-general of the National Parks, Wildlife and Plant Conservation Department, said the endangered tortoises were being kept at Bang Phra Water Bird Breeding Station in May. He had lodged a complaint with Si Racha police.

There were six *Astrochelys yniphora* and 72 *Astrochelys radiata* tortoises, both species endemic to Madagascar.

Yniphora is the rarest species of tortoise on earth. One of the six missing was about 10 years old, about 12 inches long, and worth 1 to 2 million. Each of the other five was three to four years old, six inches long, and worth about 200,000 baht.

Radiata is a radiated tortoise, considered to be one of the world's most beautiful tortoises and at high risk of extinction. They bring 3,000 - 10,000 baht each on the black market.

The missing tortoises are worth about 3 million baht in total.

Mr Adisorn said he had reported the suspected theft to Thanya Netithammakul, director-general of the department, and Natural Resources and Environment Minister Surasak Kanjanarat, who ordered the setting up of the investigation committee.

He said the tortoises were seized from wildlife traders and were being cared for at Bang Phra Water Bird Breeding Station. Madagascar had asked for their return, as allowed under the Convention on International Trade in Endangered Species of Wild Fauna and Flora, or Cites convention.



## Ecotoxicology

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## Abstract

Selenium (Se) is an essential element that can be harmful for wildlife. However, its toxicity in poikilothermic amniotes, including turtles, remains poorly investigated. The present study aims at identifying selenium toxicokinetics and toxicity in juvenile slider turtles (age: 7 months), *Trachemys scripta*, dietary exposed to selenium, as selenomethionine SeMet, for eight weeks. Non-destructive tissues (i.e. carapace, scutes, skin and blood) were further tested for their suitability to predict selenium levels in target tissues (i.e. kidney, liver and muscle) for conservation perspective. 130 juvenile yellow-bellied slider turtles were assigned in three groups of 42 individuals each (i.e. control, SeMet<sub>1</sub> and SeMet<sub>2</sub>). These groups were subjected to a feeding trial including an eight-week supplementation period SP<sub>8</sub> and a following 4-week elimination period EP<sub>4</sub>. During the SP<sub>8</sub>, turtles fed on diet containing  $1.1 \pm 0.04$ ,  $22.1 \pm 1.0$  and  $45.0 \pm 2.0 \mu\text{g g}^{-1}$  of selenium (control, SeMet<sub>1</sub> and SeMet<sub>2</sub>, respectively). During the EP<sub>4</sub>, turtles fed on non-supplemented diet. At different time during the trial, six individuals per group were sacrificed and tissues collected (i.e. carapace, scutes, skin, blood, liver, kidney, muscle) for analyses. During the SP<sub>8</sub> (Fig. 1), both SeMet<sub>1</sub> and SeMet<sub>2</sub> turtles efficiently accumulated selenium from a SeMet dietary source. The more selenium was concentrated in the food, the more it was in the turtle body but the less it was removed from their tissues. Moreover, SeMet was found to be the more abundant selenium species in turtles' tissues. Body condition (i.e. growth in mass and size, feeding behaviour and activity) and survival of the SeMet<sub>1</sub> and SeMet<sub>2</sub> turtles seemed to be unaffected by the selenium exposure. There were clear evidences that reptilian species are differently affected by and sensitive to selenium exposure but the lack of any adverse effects was quite unexpected.

Date: June 7, 2016 Source: University of Notre Dame

Decades of unregulated industrial waste dumping in areas of the Great Lakes have created a host of environmental and wildlife problems. Now it appears that Lake Michigan painted and snapping turtles could be a useful source for measuring the resulting pollution.

Researchers from the laboratory of Gary Lamberti, professor of biological sciences and director of the Stream and Wetland Ecology Laboratory at the University of Notre Dame, were working on a federal Great Lakes Restoration Initiative project to assess, enhance and restore Great Lakes coastal wetlands, when undergraduate researcher Dayna Smith suggesting checking for contaminants in turtles that were incidentally captured in fish nets. The project, funded by the U.S. Environmental Protection Agency, involves a large consortium of universities and agencies in the Great Lakes area, including Notre Dame, collaborating in a 10-year monitoring program. The program involves assessing water quality, plants, invertebrates, fish, birds and amphibians, but not reptiles.

Smith, Lamberti, graduate student Matthew Cooper and research technician Jessica Kosiara found that painted turtles, which can live up to 20 years, and snapping turtles, which live up to 50 years and are harvested for food, were common inhabitants of these wetlands. They analyzed the muscle, liver, shell and claws of captured turtles in four wetland locations for cadmium, chromium, copper, iron, lead, magnesium, manganese and zinc. The researchers discovered that all turtle individuals carried all eight metals, and that concentrations broadly correlated with assessments of metals in the soil of the wetlands. They also found that tests on small samples of shell and claw yielded results similar to those on muscle and liver, meaning that the tests can be performed without killing the turtles. Because the turtles live longer than fish and are relatively high on the food chain, they could be a useful source for measuring wetland pollution. Along with being sentinels for pollutants, snapping turtles that are consumed by humans may also pose a health risk to those individuals similar to the health advisories placed on large Great Lakes fish.

A paper describing the research, which was conducted in association with Notre Dame's Environmental Change Initiative (ECI), appears in the journal *Environmental Monitoring and Assessment*.

Story Source:

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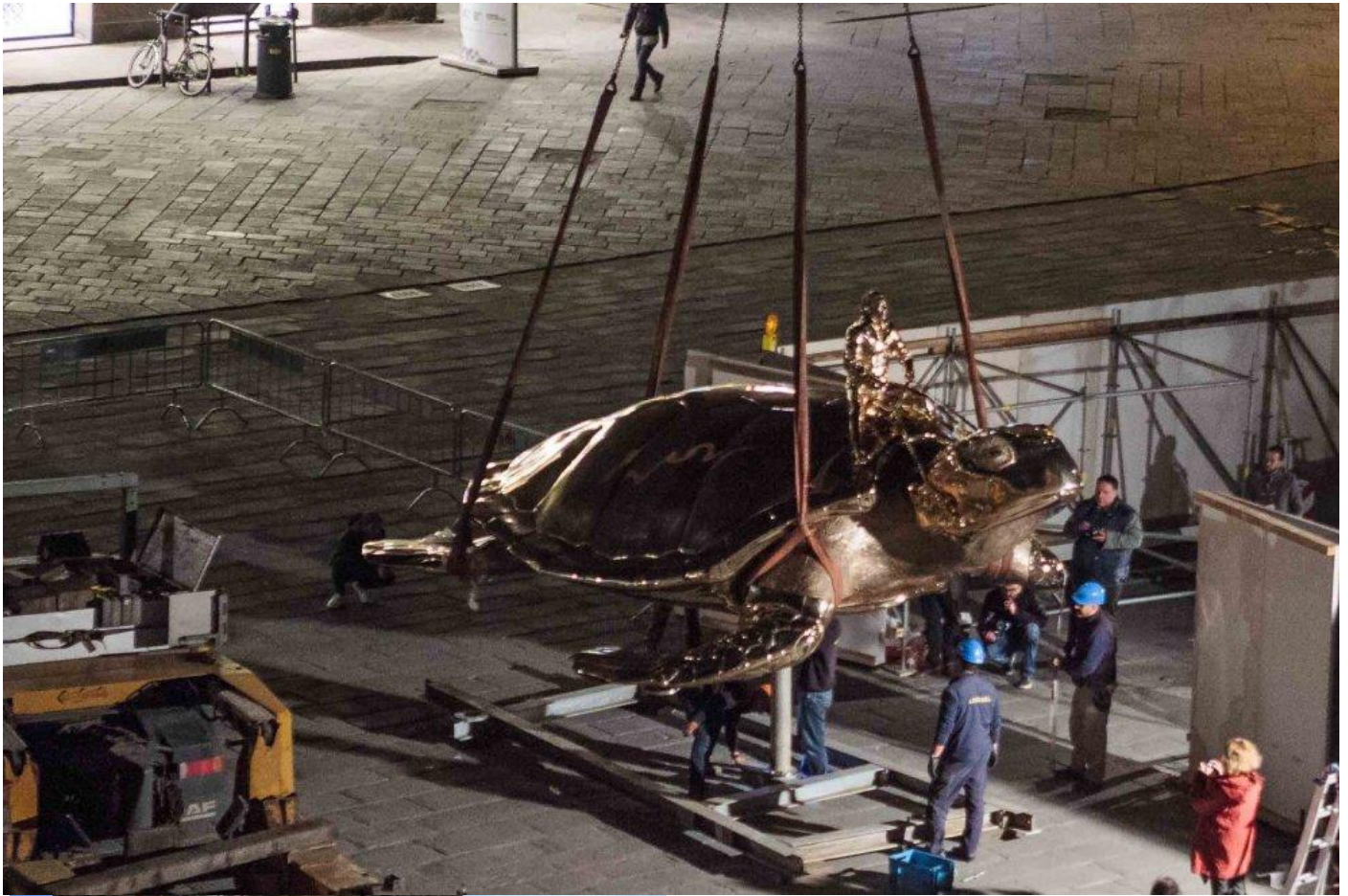
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