INFRARED TRAINING CENTER

INFRAMATION

Infrared Training Center itc™

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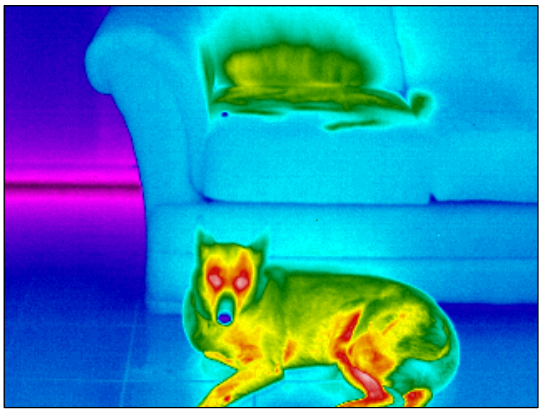
March, 2002

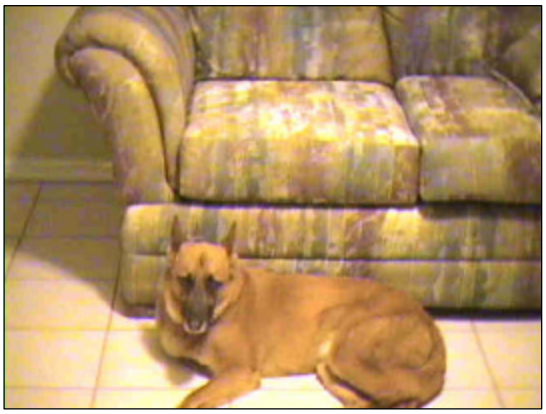
CRIME SCENE INVESTIGATIR (CSIR)

Case # - 9079
Location - Newark, New Jersey
Suspect - Red Fred
Species - Canis familiaris
Suspected Crime - Sleeping on the couch after dark.

Verdict - Guilty as charged based on the IR evidence.

Thanks to James Petersen, the Pet Detective.◆





Inside this issue:

SERPENTINE SENSORS

By Bernard R. Lyon Jr., ASNT NDT Level III, ITC Course Moderator

Thirty five milliseconds. That is the amount of time it takes a boa constrictor to respond to diffuse infrared radiation from a CO_2 laser, as measured by R. Igor Gamow and John F. Harris, researchers at the University of Colorado aerospace engineering laboratory. Perhaps I should mention that this was determined some 28 years ago. (Scientific American, May 1973)

Two families of snakes, Boidae and Crotalidae, have heat receptors. The boids include boa constrictors, pythons and anacondas, while the crotalids are pit vipers, such as rattlesnakes, water moccasins, cottonmouths and copperheads. We will focus on the pit vipers, because they are getting more attention from researchers today.

It is interesting to note that pit vipers have often been found electrocuted near hot spots on electrical equipment. These snakes, capable of detecting thermal radiation, may view the hot spot as a warm blooded animal and slither up the power pole in search of a meal. A bird perched on a wire could easily be mistaken for a hot connection by a person with an infrared camera. So, it seems reasonable to assume that a hot connection could be mistaken for a bird, by a snake.

> ***"Biodiversity is our most valuable but least appreciated resource."***
> *Edward O. Wilson*
> *In* ***The Diversity of Life****, 1992*

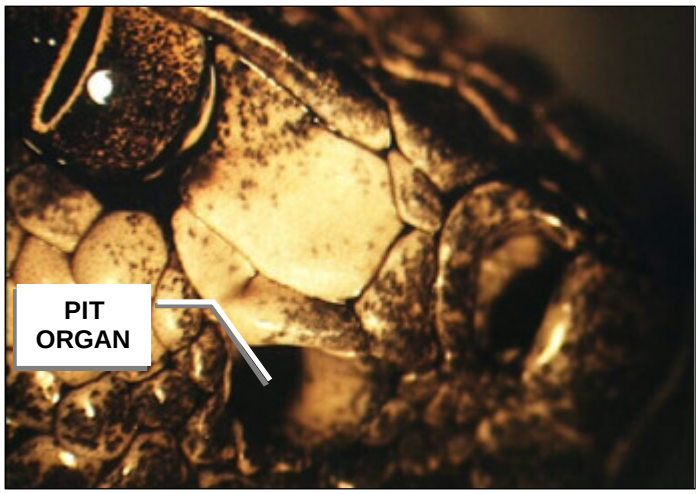
Pit vipers have "pit organs," which always face forward. These are located on their snouts between their eyes and nostrils. There are no lenses in these organs. So they do not form an image, like eyes.

(Continued on page 2)

SNAKE IR (CONTD.)

(Continued from page 1)

According to Dr. Massoud Motamedi, the director for center of bioengineering at the University of Texas Medical Branch (UTMB) at Galveston, pit vipers are capable of detecting changes in temperature as small as two to three thousandths of a degree. This certainly exceeds today's state-of-the-art electronic sensors.



Small mammals are the favorite prey of rattlesnakes. When hunting at night, they are sometimes seen moving their heads side to side. Apparently this is done to scan their pit organs in search of warm objects. They can detect the presence of a warm-blooded animal up to 50 centimeters away in total darkness. Evidence indicates that the nerve impulses from the pit organs cross to opposite sides of the brain, producing depth perception, which allows the snake to strike its prey with uncanny precision.

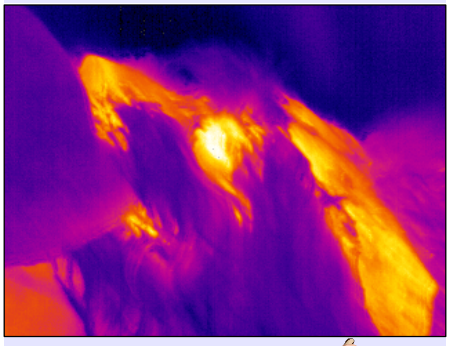
Scientists believe that a light-sensitive protein capable of responding to low temperatures may be the key to understanding the nature of the snake's receptors. Dr. John Pierce, an engineering professor at the University of Texas at Austin, is helping the U.S. Air Force to study remote sensing capabilities found in snakes and beetles. He is a co-principal investigator in a five million dollar project, which includes researchers in Iowa, Germany, Florida, and the UTMB.

According to Pierce, his modeling has been verified by experiments conducted at UTMB by Dr. Burgess Christensen and Dr. Massoud Motamedi, who captured pictures of the environment the snake senses, using thermal imaging cameras — operating at bandwidths of 3-to-5 and 8-to-12 microns. Photomicrographs bestowed by Dr. Anke Schmidt, of the Institut fur Zoologie, in Bonn, Germany and thermal properties of the viper's membrane, provided by Dr. Vladimir Tsukruk, of Iowa State University, were significant contributions towards this research.

Where will this research lead to? According to Pierce, "The Air Force wants to see if they can mimic the biological system and get a better missile detector." Defense systems could become more sensitive thermally and spatially, enabling them to detect enemy warheads with greater speed and accuracy. Robert Cohn, the U.S. Air Force program manager said "We're taking a comprehensive look at the physiological, genetic and molecular dynamics of these animals' infrared systems to develop new and novel detection schemes."

Since this is essentially "uncharted territory," Dr. Motamedi states that it is difficult to say when scientists will be able to build a device capable of operating by means of snake protein. After all, evolution has been working on this process for billions of years, while biomemetics (the field of science that tries to decipher, mimic and adopt natural processes for potential use in technology applications) has been here for only a short while. So, don't expect to trade in your infrared camera for the viper-cam any time soon.◆

BRAINTEASER OF THE MONTH



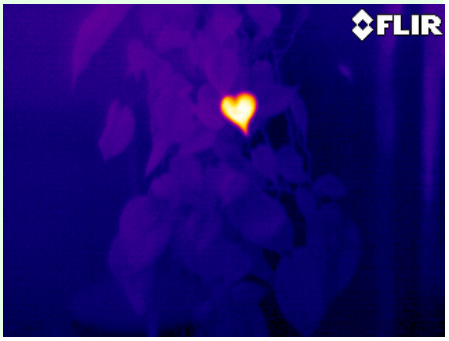
Here is this month's brainteaser. First reader to email me with the correct explanation wins $20 in Infrabucks. Please put "Brainteaser" as the subject of the message.◆

Mailto: Gary.Orlove@infraredtraining.com

LAST MONTHS'S BRAINTEASER

February's Brainteaser was a heart shaped plant leaf, heated by a devious thermographer for Valentines Day!

Congratulations to A.J. LeClercq of Motiva Enterprises for his correct answer.◆



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"Delivering world-class training and knowledge about thermography"

About the Infrared Training Center

The Infrared Training Center offers training and certification in all aspects of infrared thermography use. Our world-class training facilities are located near Boston, Massachusetts, USA and Stockholm, Sweden and have the world's most extensive hands on laboratories for infrared applications. Please join us in exploring the fascinating world of infrared!

Your comments and suggestions about this newsletter are welcomed and encouraged. If you have an interesting application or case study to share, we encourage you to submit it for publication.

Please e-mail mailto:Gary.Orlove@infraredtraining.com or regular mail to the USA office

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Upcoming Classes - Americas

Remember we also teach customer site training courses at your convenience. Please contact us for more information.

March 2002
- 4-8 – Level I – Boston, MA
- 11-14 – Level II – Seattle, WA
- 11-14 – Level I – Pittsburgh, PA
- 11-15 – Level I – Peru
- 18-22 – Level I – Venezuela
- 18-21 – Level I – Indianapolis, IN
- 18-21 - Level I - Vancouver, BC
- 25-28 – Level I – Edmonton, Canada
- 26 – ThermaCAM Reporter Software – Boston, MA
- 26-28 – R&D – Raleigh, NC

April 2002
- 1-5 – Level I – Boston, MA
- 2-5 – Level I – Washington, DC
- 8-11 - Level II - New Orleans, LA
- 8-12 – Level I – Chile
- 15-18 – Level I – Honolulu, HI
- 15-18 – Level I – Montreal, Canada
- 15-19 – Level II – Boston, MA
- 22-25 – Level II – Denver, CO
- 22-26 – Level I – Mexico

May 2002
- 4/29-3 – Level I – Boston, MA
- 6-10 – Level I – Brazil
- 7-10 – Level III – Boston, MA
- 7-10 – Level I – Anchorage, AK
- 20-23 - Level I - Los Angeles, CA
- 21-24 – Level I – Lake Charles, LA
- 21-24 – Level I – Cleveland, OH

June 2002
- 3-7 – Level I – Boston, MA
- 10-14 – Level II – Boston, MA
- 10-13 – Level II – Indianapolis, IN
- 24-27 – Level I – Las Vegas, NV

Upcoming Classes - International

March 2002
- 4-8 - Level I (Swedish)
- 18-22 - Level I - Singapore
- 25-29 - Level I - Malaysia
- 25-29 - Level I - South Africa (ABB)

April 2002
- 15-19 - Level I - China
- 22-26 - Level I - Hong Kong
- 22-26 - Level I - UK
- 29-May 3 - Level I - Australia

May 2002
- 13-17 - Level I - Indonesia
- 20-24 - Level I - Japan

June 2002
- 3-7 - Level I
- 10-14 - Level II - South Africa
- 17-21 - Level II - UK
- 24-28 - Level I

Upcoming Classes - Germany

March 2002
- 11-13 - Operator CM
- 11-16 - Level I EN 473

April 2002
- 9-11 - R&D
- 22-24 - Operator CM
- 22-27 - Level I EN 473

May 2002
- 14-16 - Operator CM
- 14-16 - Level I EN 473 (part 1)
- 22-24 - Level I EN 473 (part 2)

June 2002
- 24-26 - Operator CM
- 24-29 - Level I EN 473

Upcoming Classes - France

March 2002
- 4-6 - Operator CM
- 18-20 - Operator CM

April 2002
- 8-10 - Operator CM
- 22-24 - Operator CM

May 2002
- 27-29 - Operator CM

June 2002
- 10-12 - Operator CM