THAILAND'S BOATING ACCIDENT WITH A NATIONAL STAR

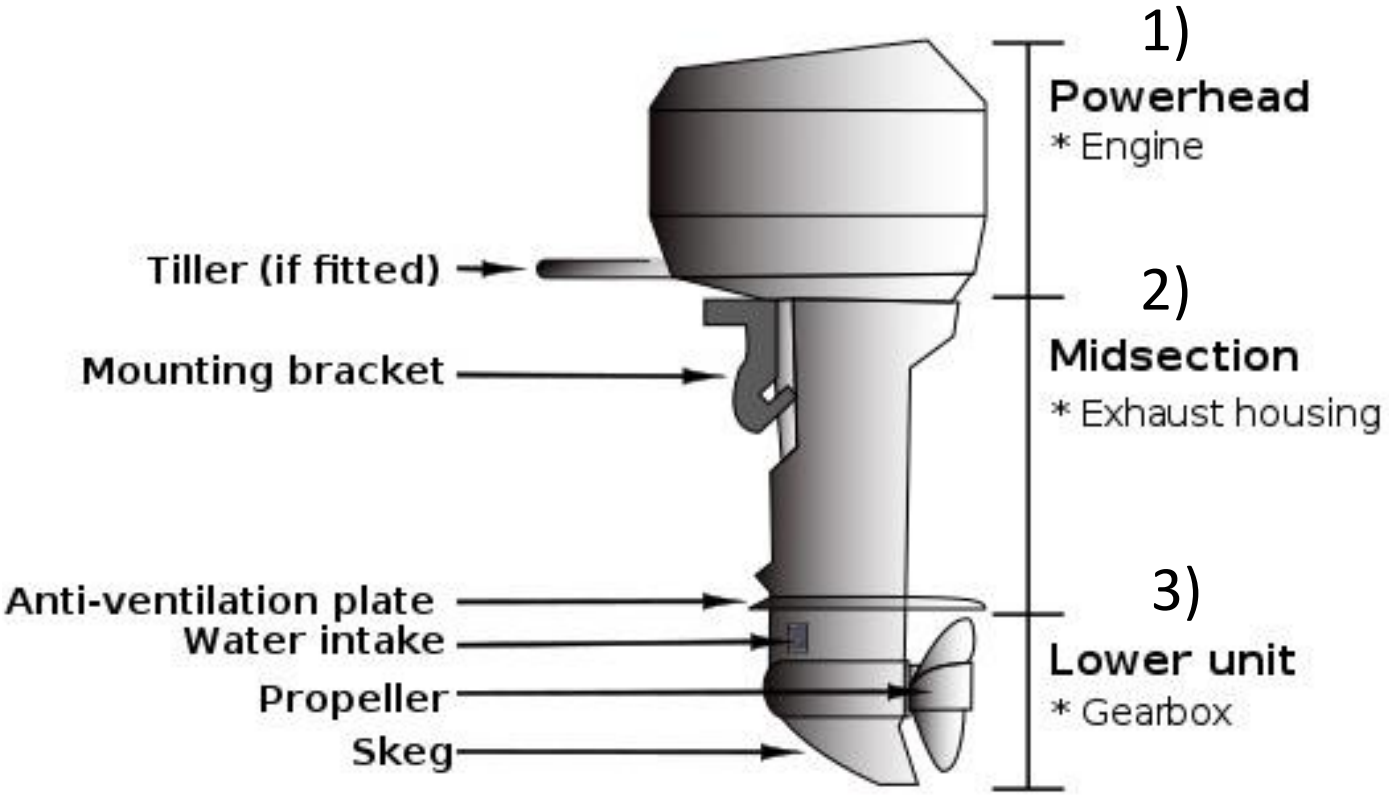
Part 1: Biomechanics of Propeller Injuries

Dr. Tavatchai Kanchanarin
Thailand

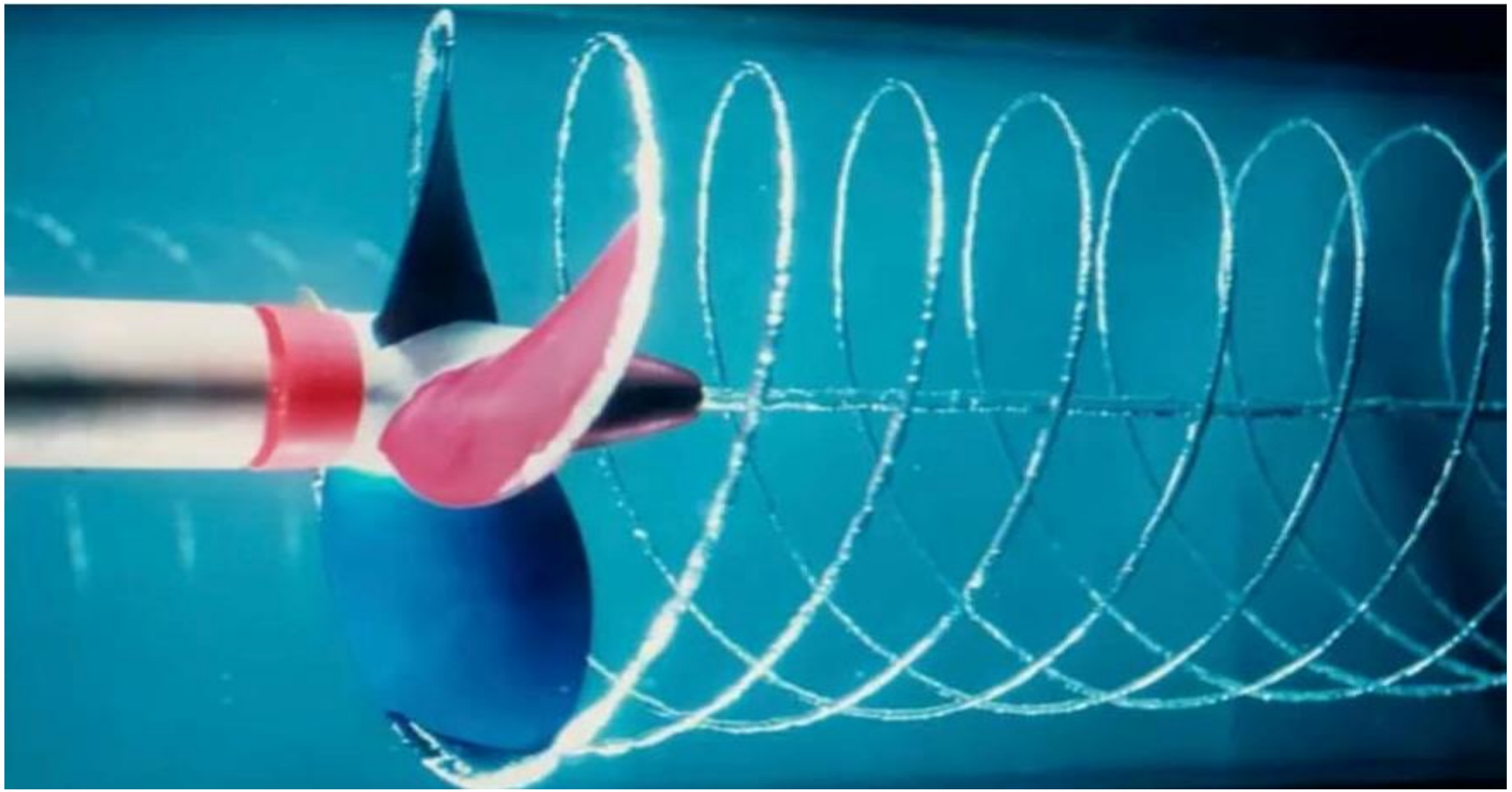
- Watercraft can inflict both blunt and sharp force trauma
- Blunt-force trauma is caused by hulls, keels, and dull parts of gearbox, the lower unit of a marine motor
- Sharp-force trauma is caused by propeller blades

http://cobalt-smi-dev.ibsinternet.com/outboards/sc-series/25sc/

- An outboard motor is a propulsion system for boats
- The motor consists of three main sections: 1), 2), 3) lower unit
- The lower unit is under the water and contains various components including skeg and propeller



https://commons.wikimedia.org/wiki/File:Outboard_motor_drawing.JPG

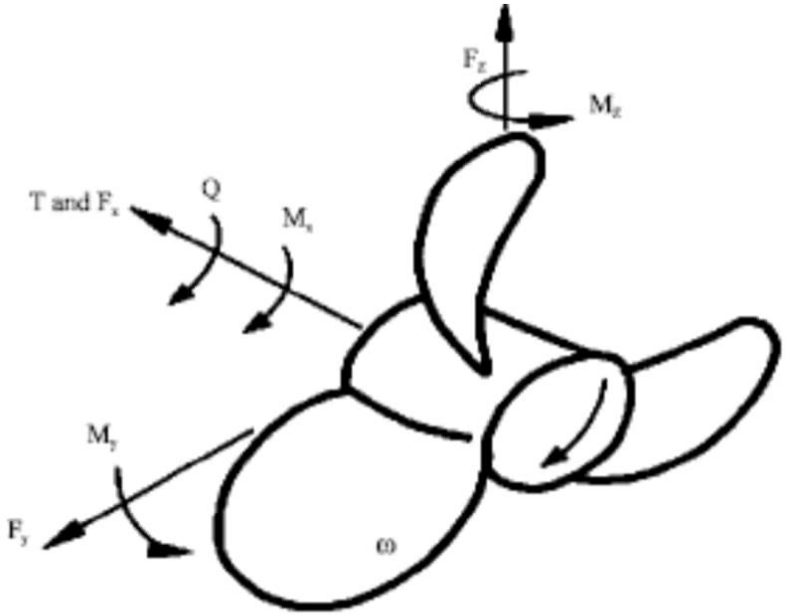


- A 3-blade propeller at 3,200 revolutions per minute (rpm) will impact 160 times in one second.
- This equates to the propeller travelling the length of a 6 foot tall man in 0.08 seconds with 14 strikes

https://dx.doi.org/10.4172/2167-1222.1000267

- Chop wounds, caused by a propeller, a cross between sharp and blunt force wounds – a sharp wound with a dull edge
- The edges, relatively sharp, may have marginal abrasion
- The parallel series of wounds = characteristic of a propeller

Investigations and Psych Profiling - ppt video online download (slideplayer.com)



Forces and moments for marine propeller

scialert.net/fulltext/?doi=jas.2014.1078.1082

Propeller injuries are typically…….lacerations.

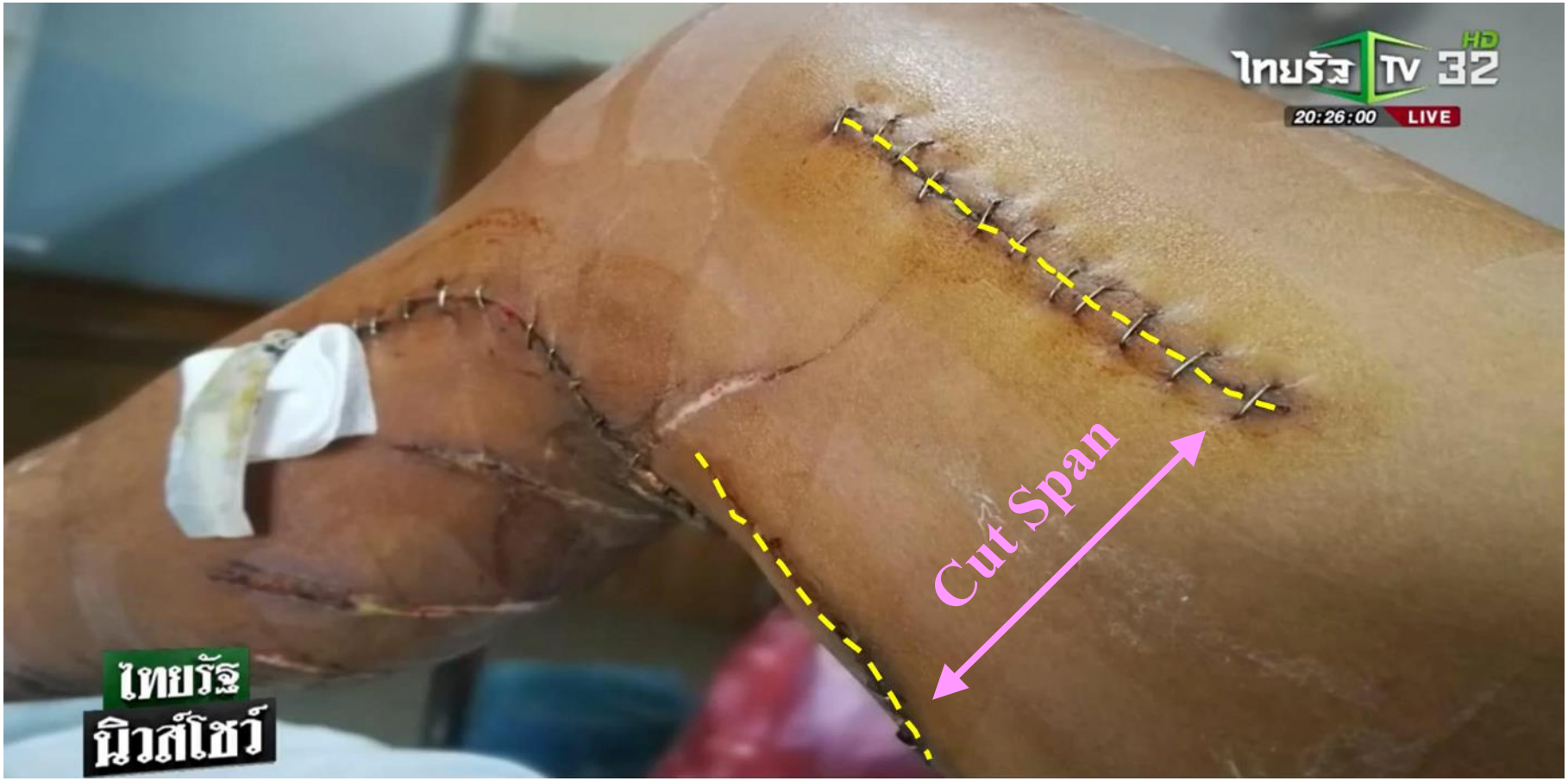
- multiple
- deep
- parallel
- equidistant
- curved (at least on wounds from smaller propellers)

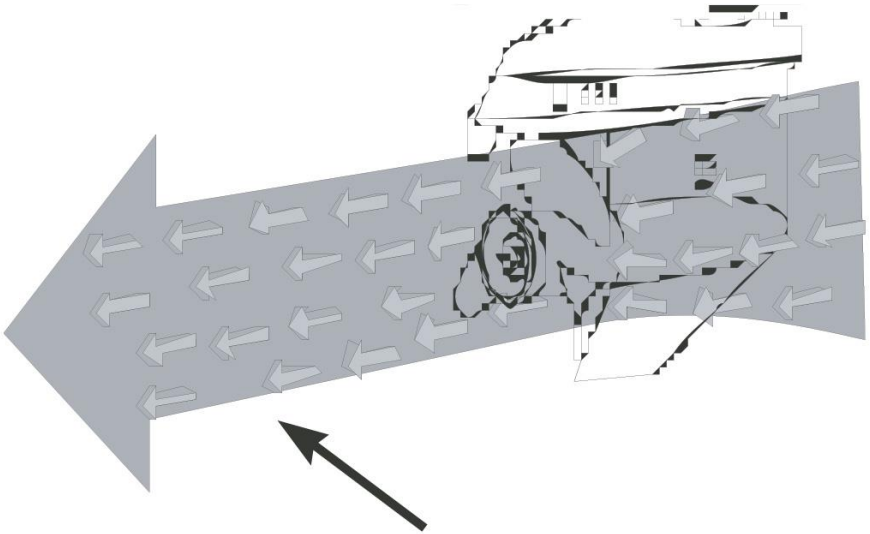
https://www.reddit.com/r/WTF/comments/11okv5/boat_propellers_can_be_dangerous/

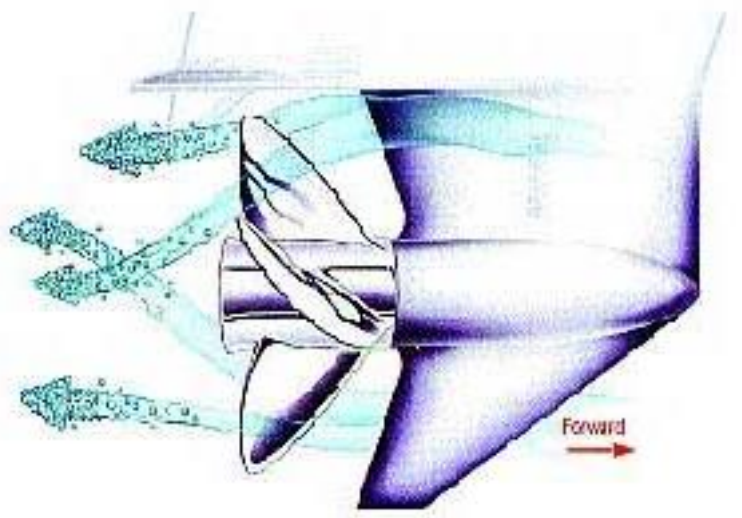
Wound Axis

- If there are two or more cuts, a wound axis may be determined.
- The wound axis is a line passing through the center of each cut in the series.
- The wound axis is an estimate of the travel path of the watercraft and its propeller.

- Distance or **Cut Span** is the distance, along the wound axis, between successive cuts.
- Cut Span can be measured from leading edge to leading edge or from trailing edge to trailing edge.

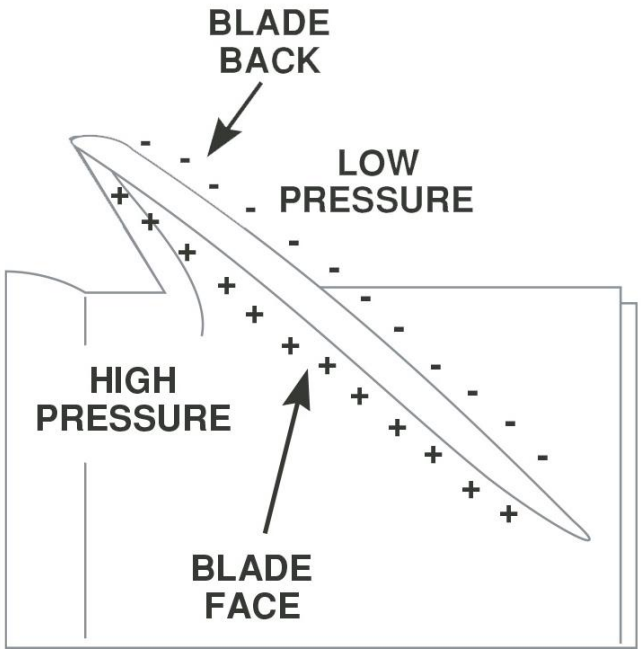






RIGHT-HAND ROTATION

- A propeller is a set of identical twisted blades.
- Each blades has two surfaces that displace water.
- The blade back creates low pressure that pulls the boat forward.
- The blade face creates high pressure that pushes the water backward. As the water is pushed to the rear, an equal force pushes the boat forward.



A. **LEADING EDGE:** The edge of the blade closet to the boat.

B. **TRAILING EDGE:** The edge of the blade farthest from the boat.

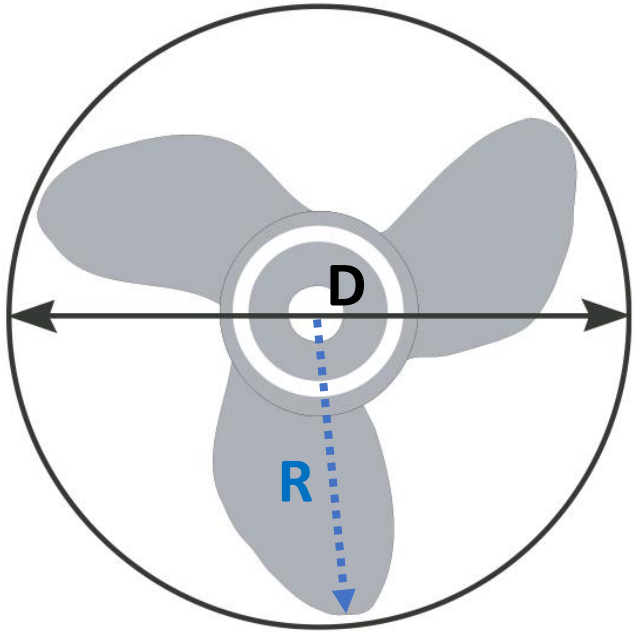
C. **BLADE TIP:** The point on the blade farthest from the hub.

D. **BLADE ROOT:** The area where the blade attaches to the hub.

E. **BLADE BACK:** The side of the blade closest to the boat. (LP)

F. **BLADE FACE:** The side of the blade opposite to the boat. (HP)

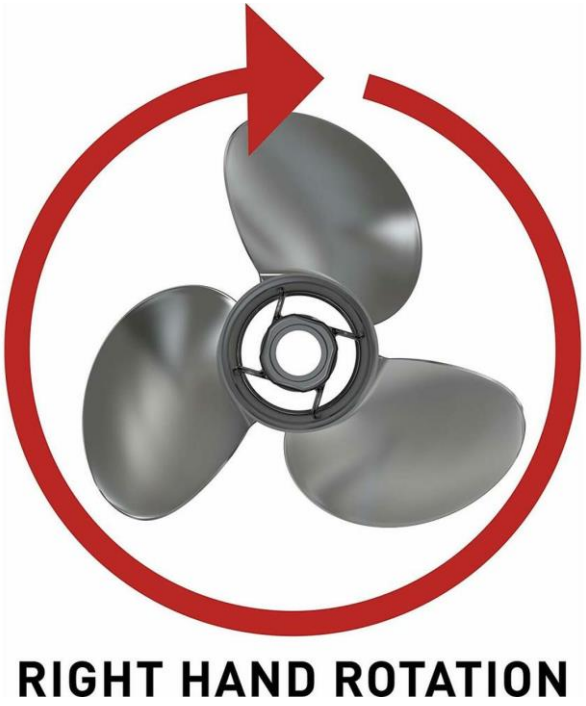
- ***Diameter*** is the distance across a circle encompassing all of the propeller blades.
- Diameter is two times the radius, the distance from the center to the tip of the blade
- Propeller diameter determines the amount of power a propeller can apply to the water—how much load the propeller can push.



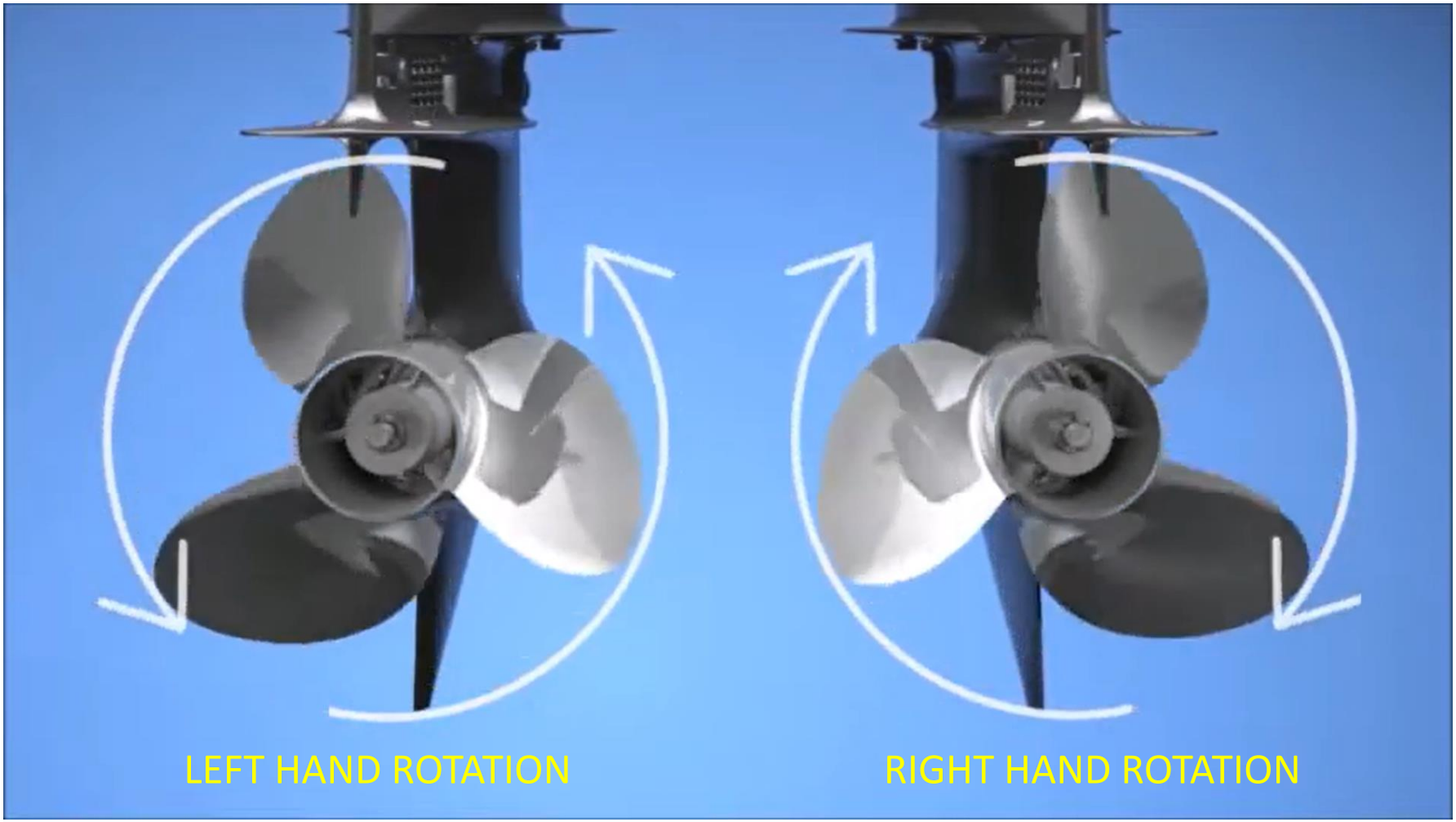
D = 2R

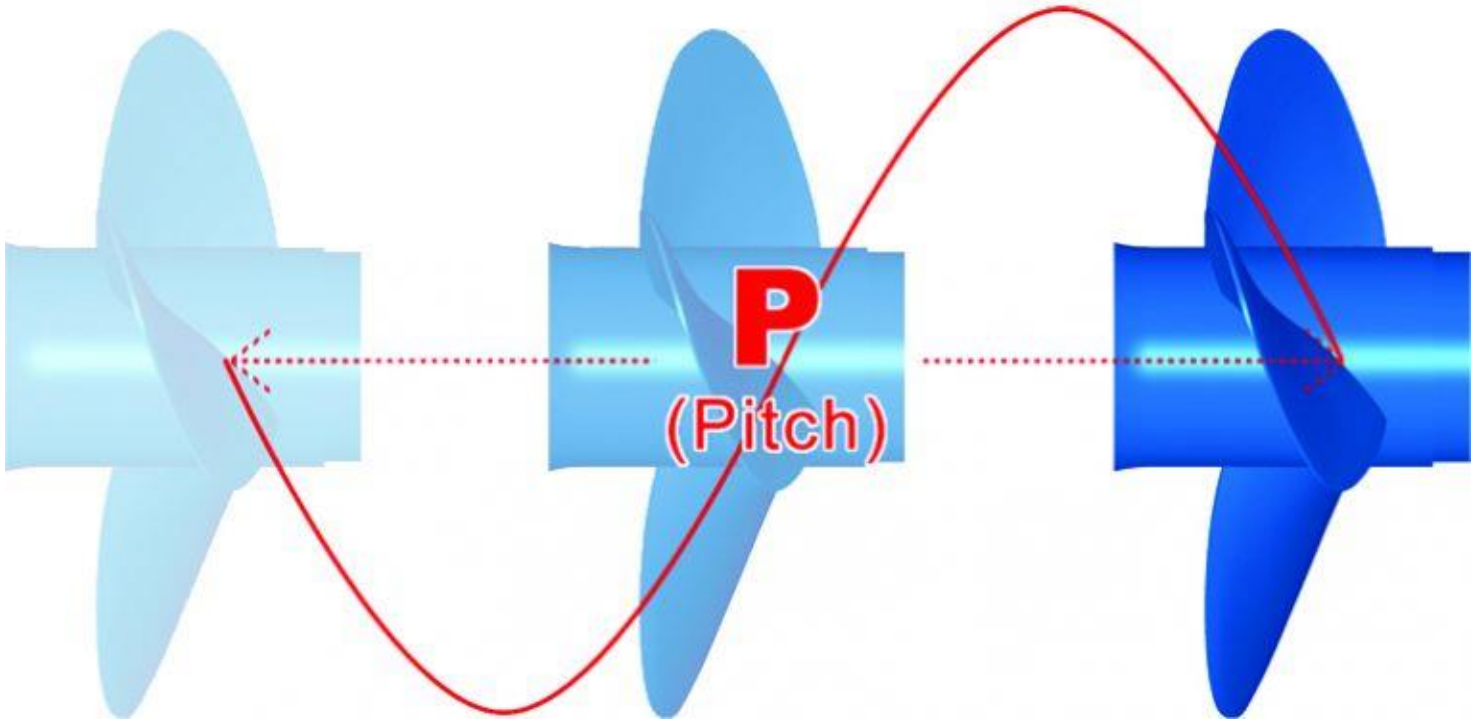
Right hand or Left hand Rotation?

- ***In most cases, right hand propellers*** are use for single engine applications.
- Left hand propellers are used for twin engine applications to achieve better steering control.

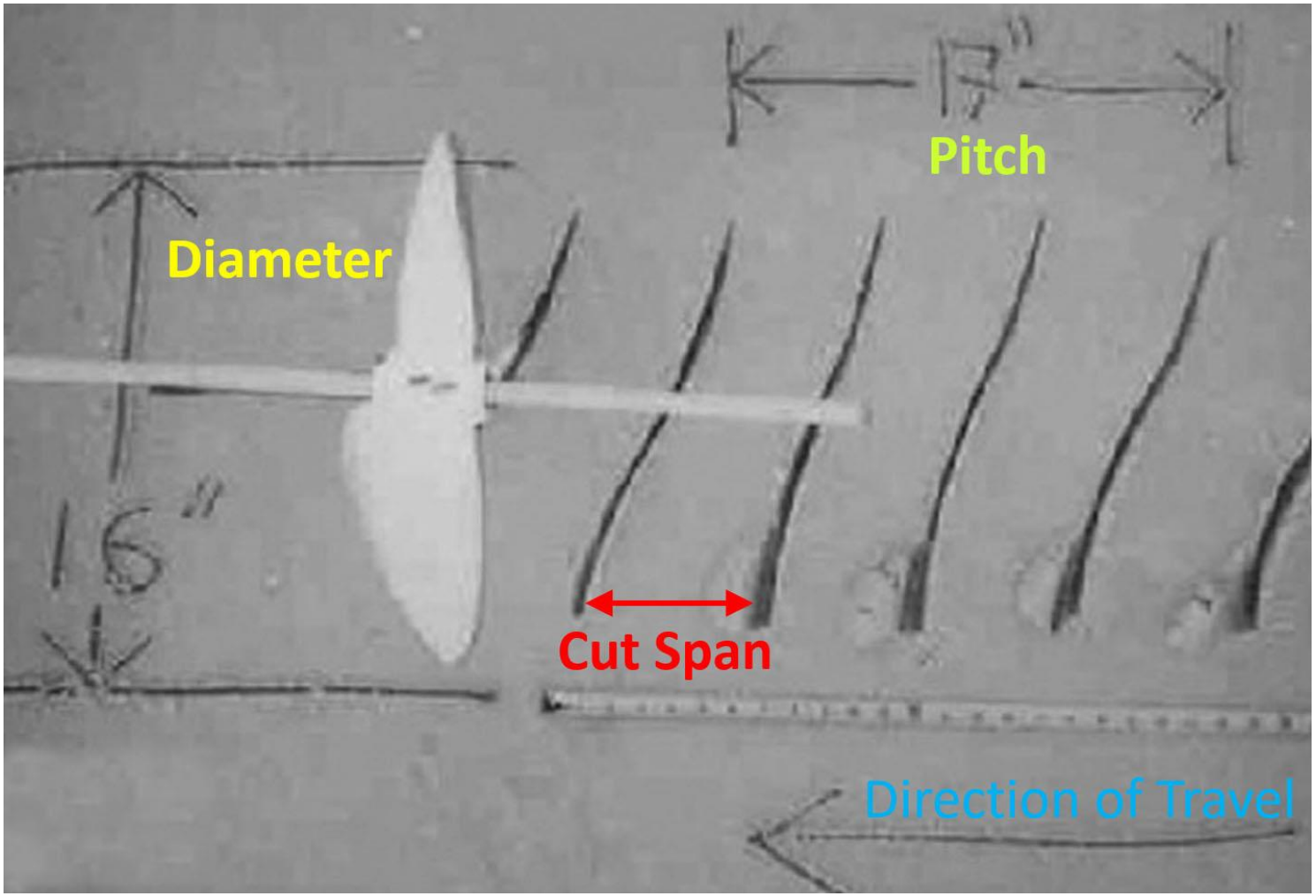


In the case of twin-engine boats, to avoid the torque effect, the propellers must turn in opposite directions for the same thrust effect.



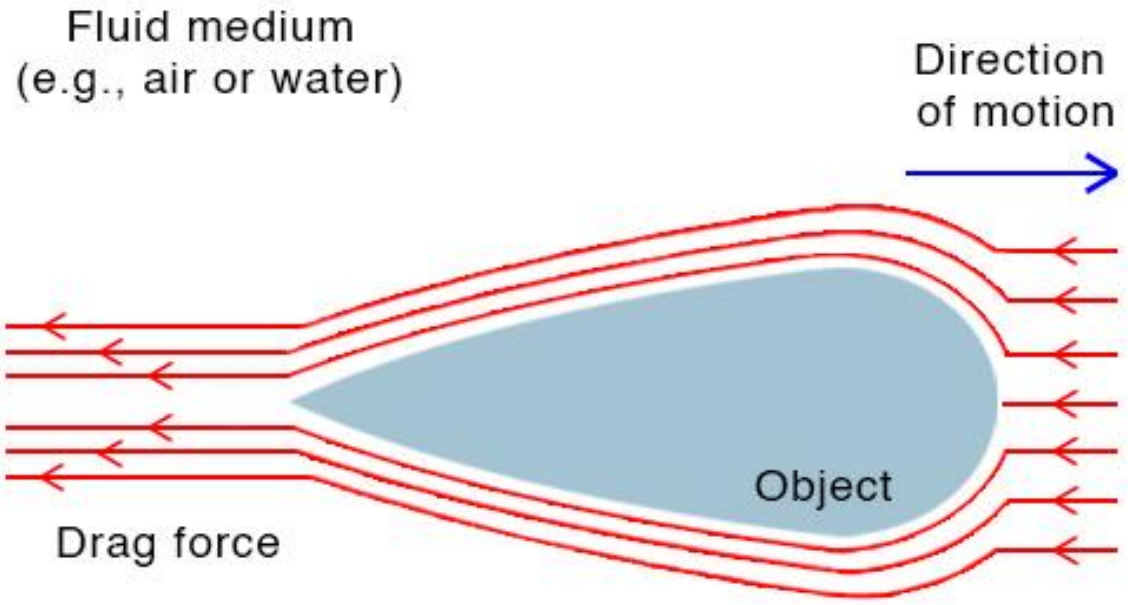


- Propulsion follows a screw mechanism.
- Pitch is the theoretical distance a propeller will move through the water for each revolution. (i.e. a 21” pitch propeller should move a boat forward 21” for each revolution, assuming there is no slippage).

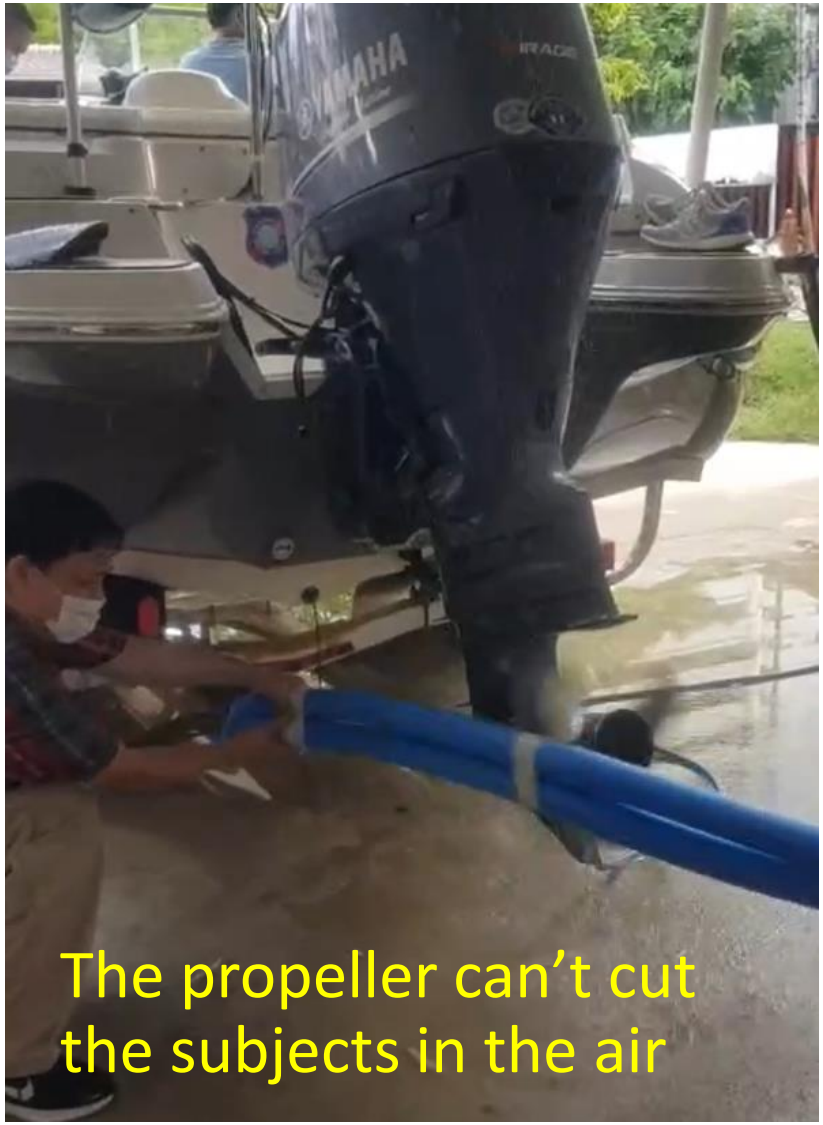


www.tampabay.wateratlas.usf.edu

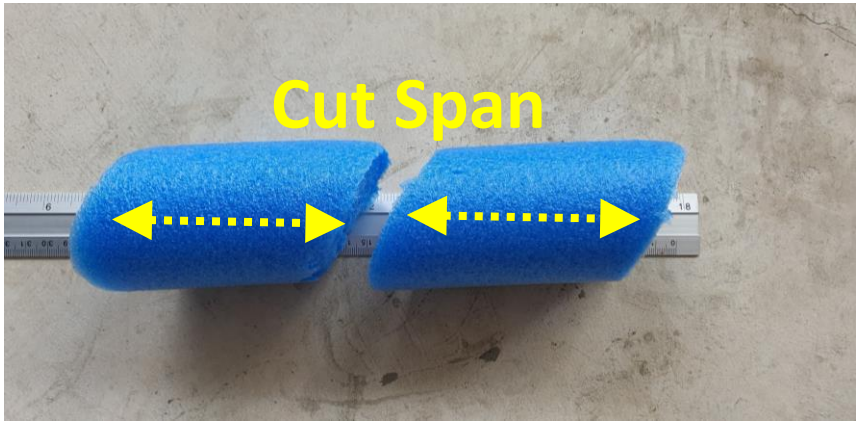
Impressions in sand made by a propeller, illustrating how rotation and pitch influence propeller patterns. The 3-bladed propeller with diameter 16 inch, pitch 17 inch, has moved from the right to the left. Note that each entry cut is cleaner than the exit cut.



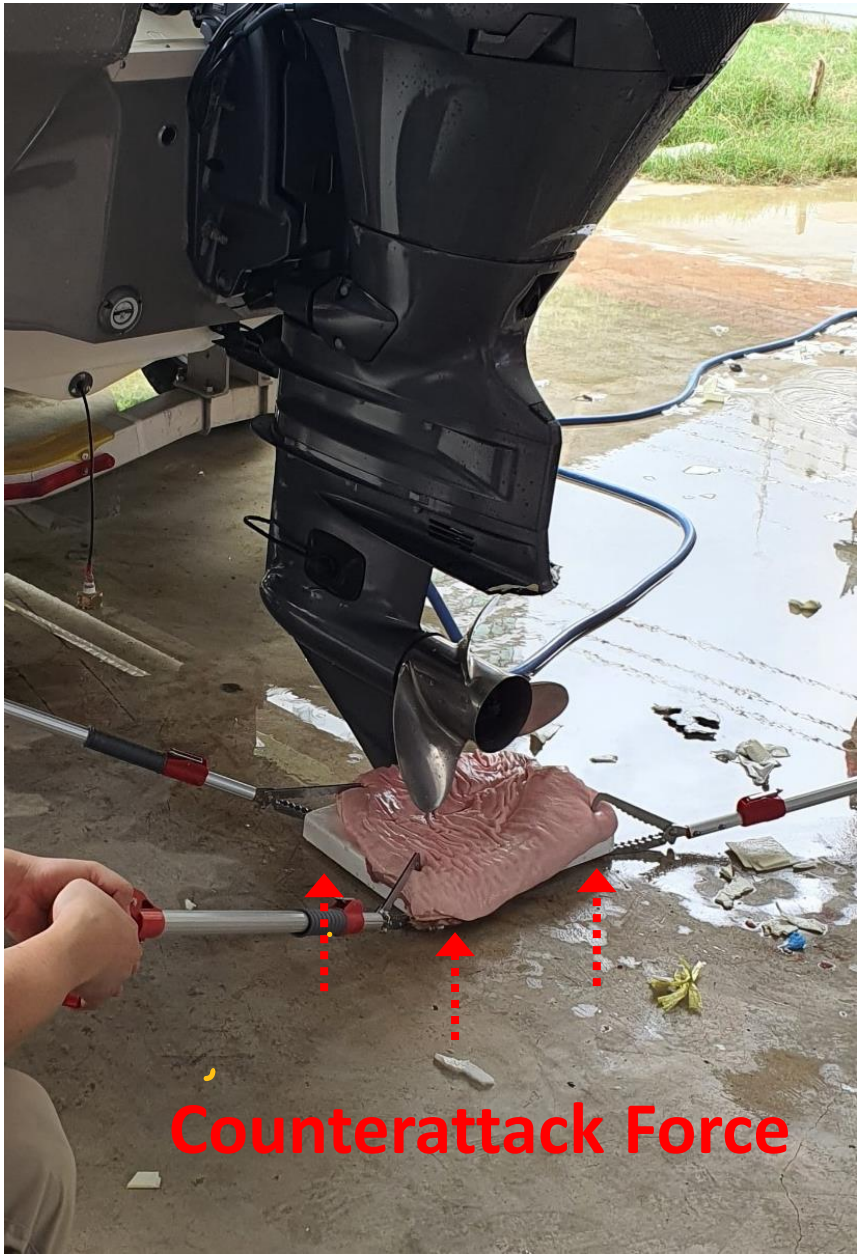
- Drag coefficient quantifies the drag or resistance of an object in moving fluid.
- Amount of drag depends on the density of the fluid.
- Water is approximately 50 times more viscous than air.
- Higher drag forces make it more difficult for a man to be pushed away after being hit by a propeller under water.



In air, very few drag coefficient, after the first strike the subjects will be bounced with little resistance from the air.



Increase the resistance by **Counterattack Force** while moving foam noodles along the axis



The experimental pork was finely chopped

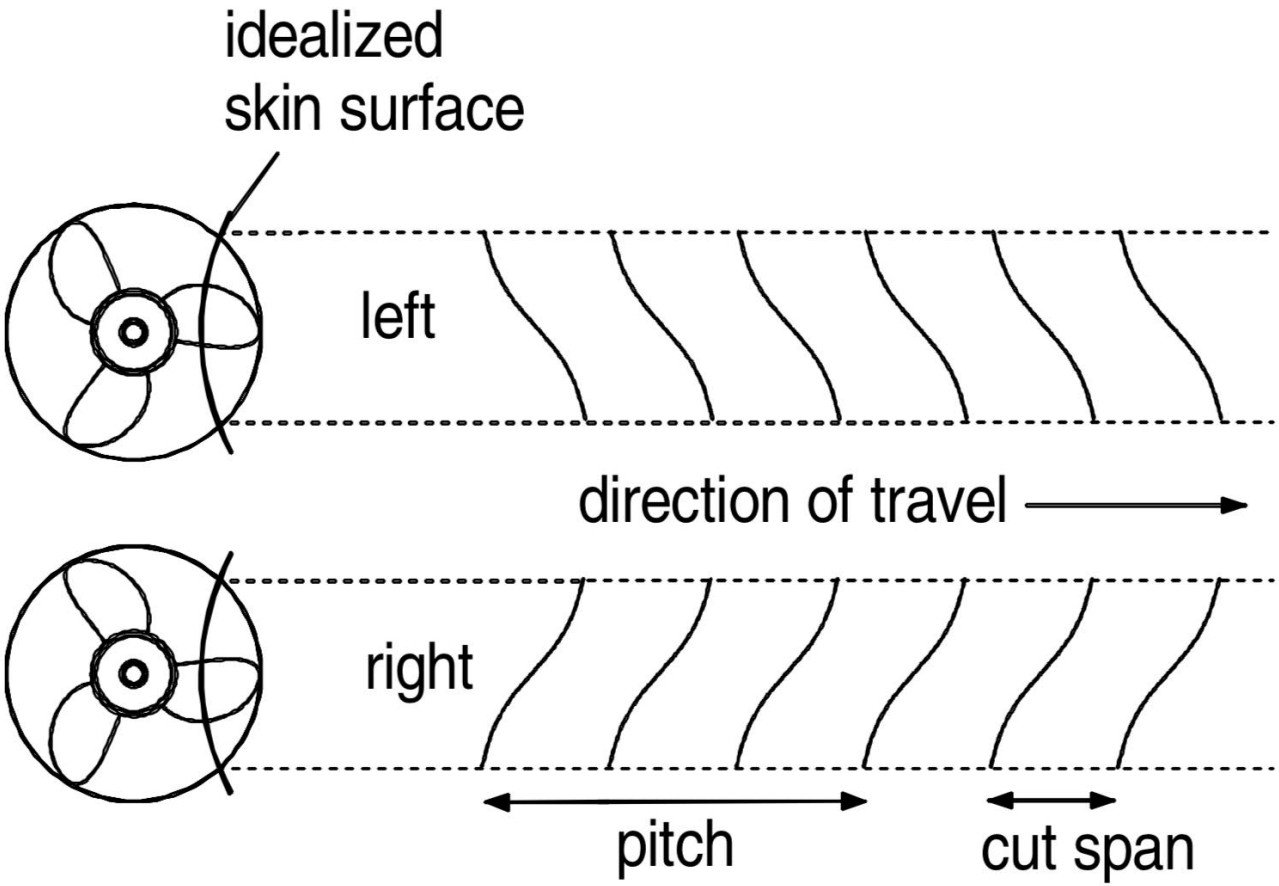
Correspondingly, with increasing the resistance by fixing object

The Royal Thai Police conducted the propeller test in a pig

The wounds are multiple and parallel, not isolated

The wound pattern inflicted by a right-handed propeller always has a pattern opposite that of a left-handed propeller.

In the case of twin-engine boat



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Wounds of Different Shapes

- **The shape** of the cuts made by a propeller will be **proportional to the depth** of penetration.
- The percentages were computed from depths of blade penetration divided by the diameter of the propeller

    A. Shallow (10%)

    B. Moderate (20%)

    C. Deep (40%)

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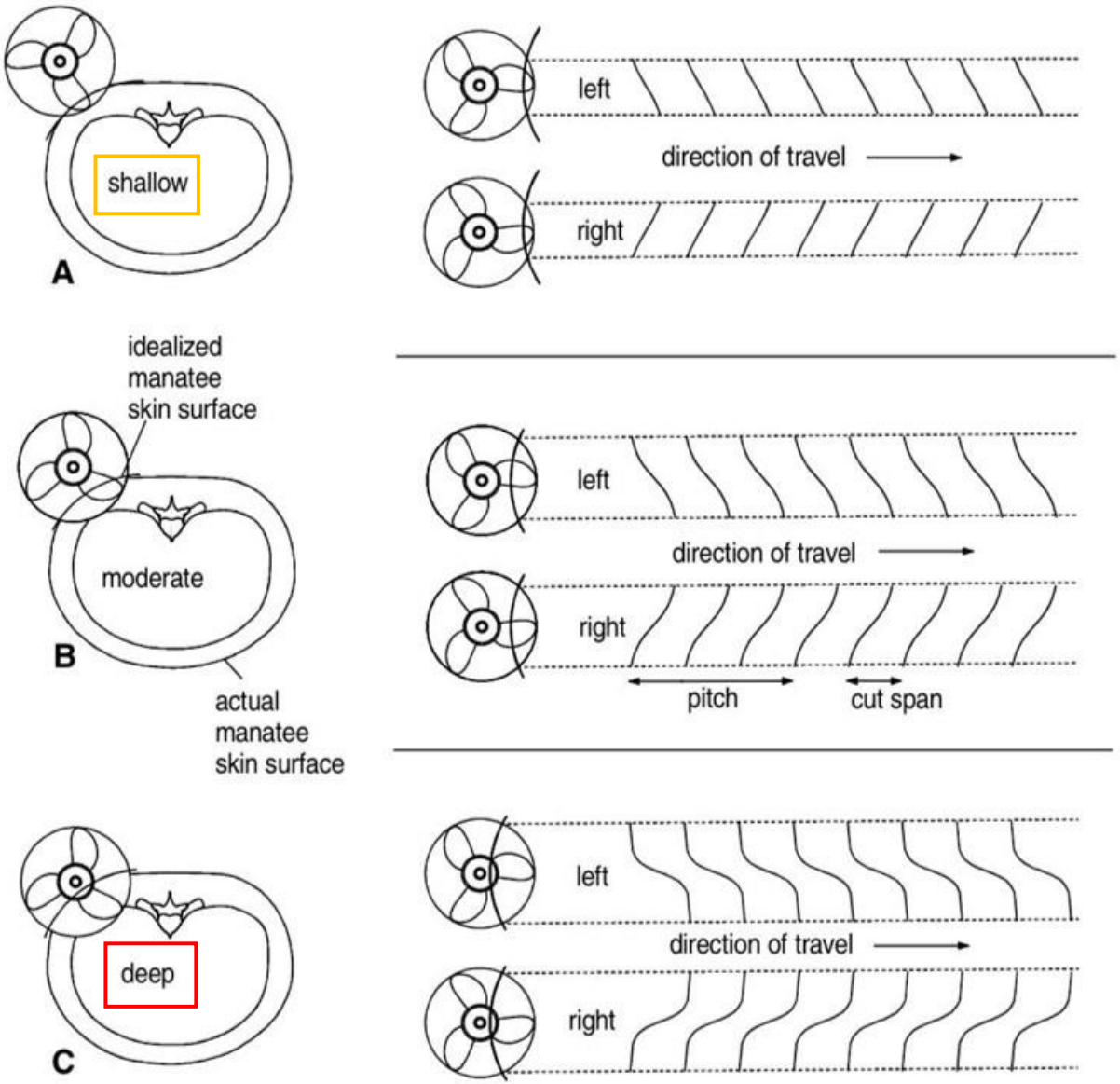
Influence of the Depth of Penetration on Wound Shapes



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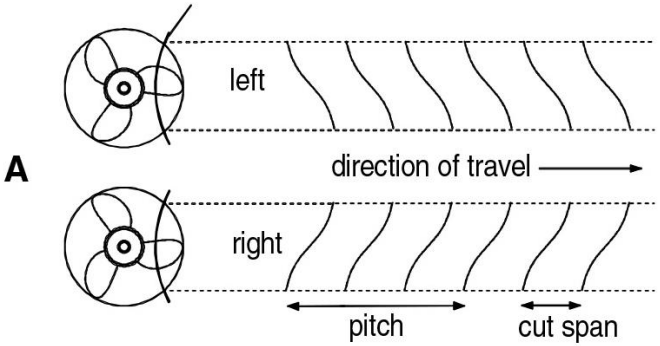
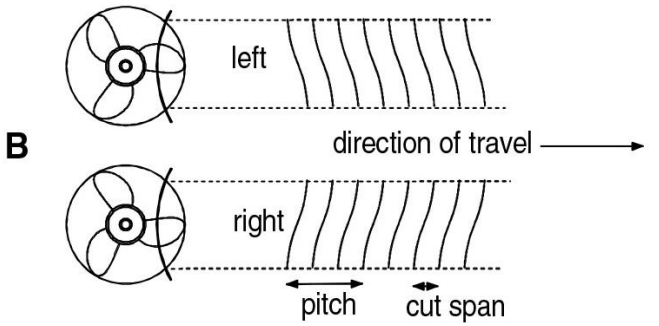
Influence of Pitch and blade number on Wound Spacing

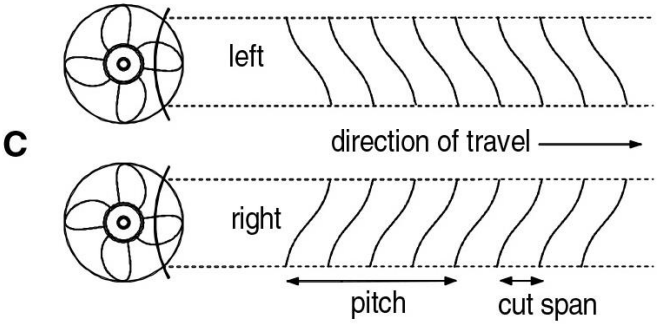
Three-bladed 14D21P



Three-bladed 14D9P



Four-bladed 14D21P



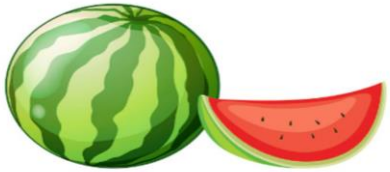

END OF PART 1

THAILAND'S BOATING ACCIDENT WITH A NATIONAL STAR

Part 2: The Mystery of Tangmo Nida's Death

WATERMELON

Tangmo in Thai



2,299 Posts | 2.3M Followers | 1,126 Following

a famous Thai actress, model, and singer

a certified **nursing assistant**

- Traveling on a speedboat along the Chao Phraya River
- Not wearing any life jacket and neither were her 5 friends

One propeller with 3 blades
Diameter = 14 inches
Pitch = 19 inches

Tangmo fell into the river during her urination at the stern while the speedboat was moving forward!

Wearing a one-piece bodysuit

How is it possible to pee?

When SO wear bodysuits, they got to take the whole things off if they want to pee

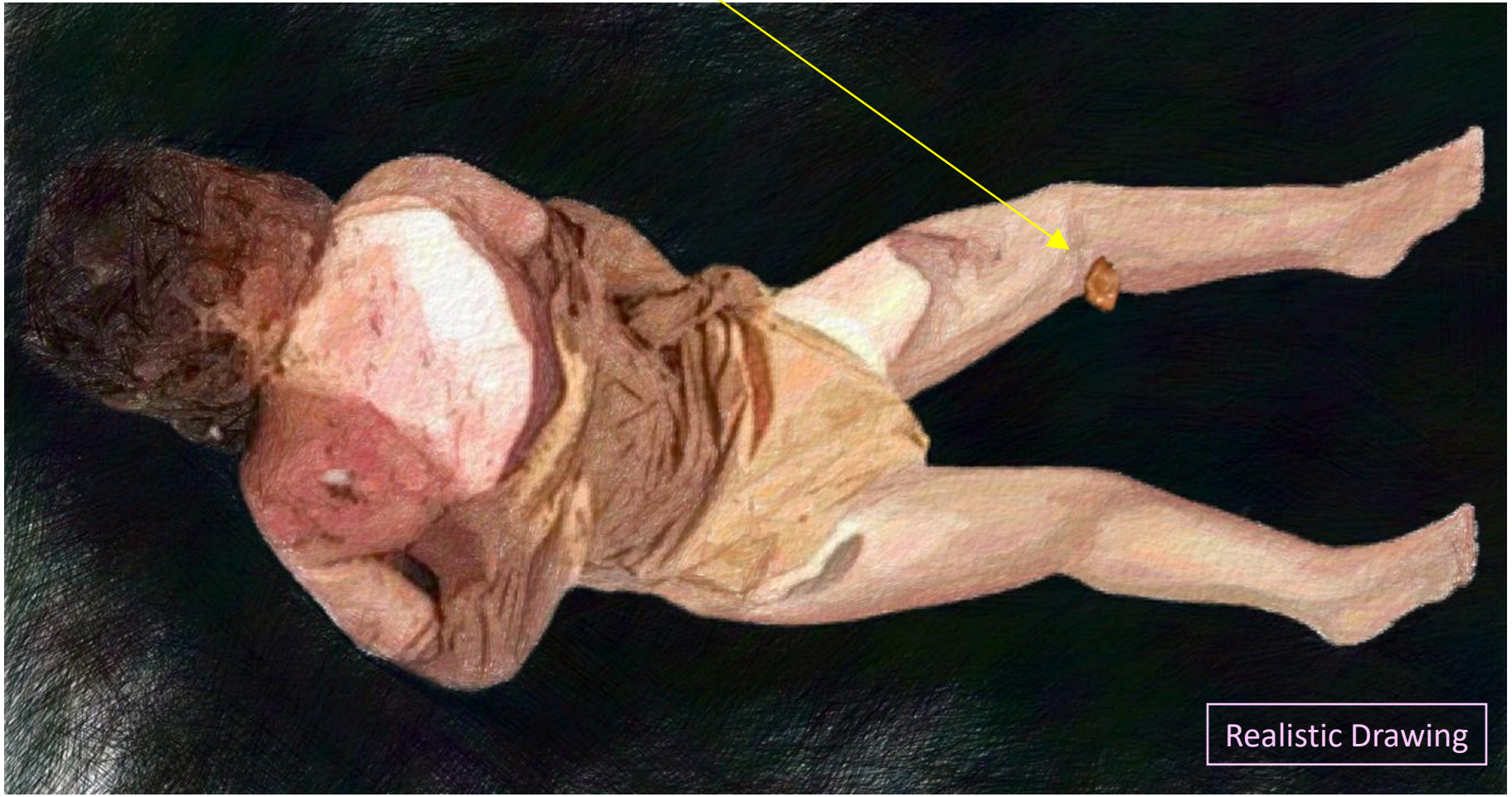
Her body was found after the 38 hours long search operation

According to rescuers, there were two obvious wounds

- A large long cut on the inner side of the right thigh

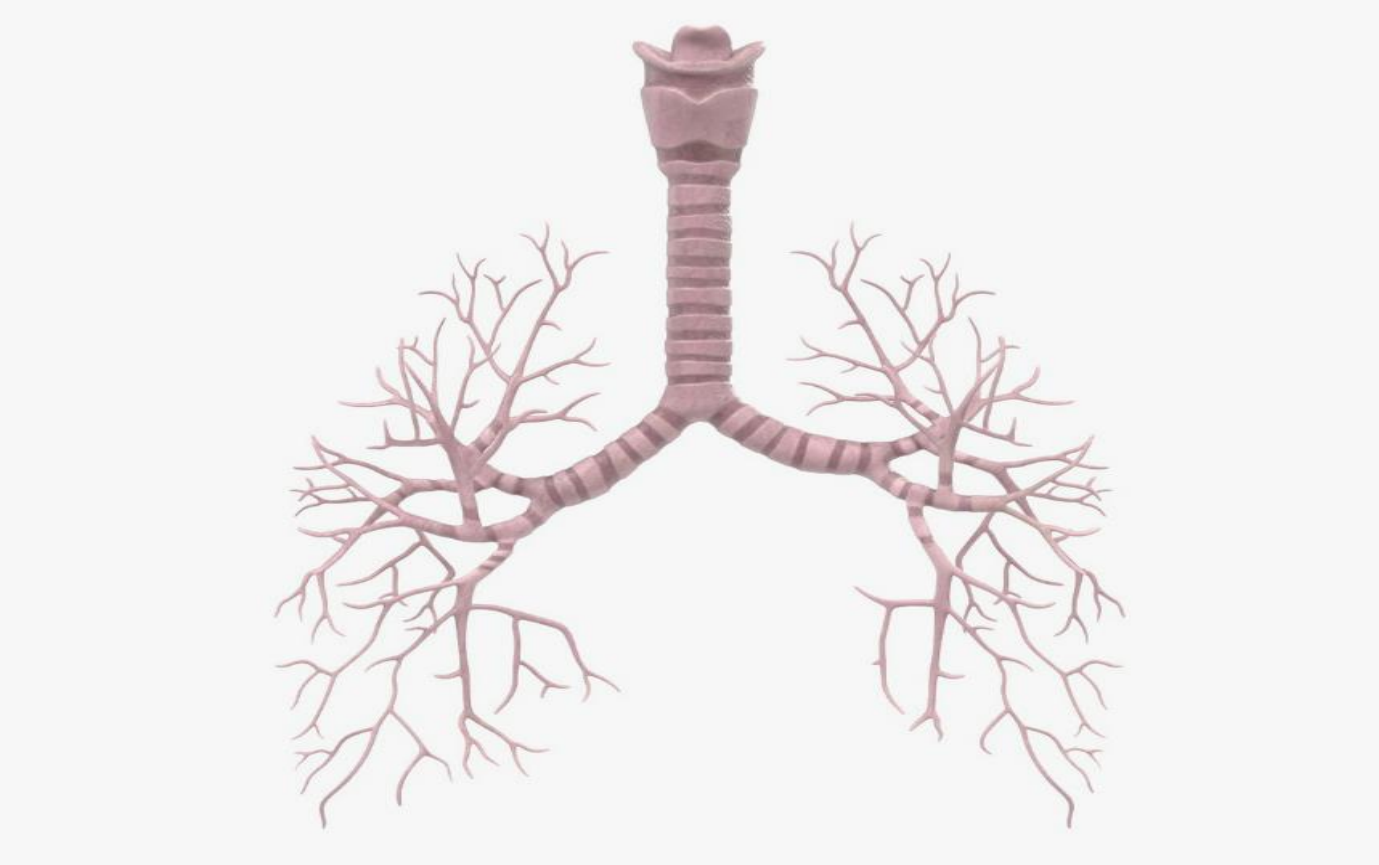
According to rescuers, there were two obvious wounds

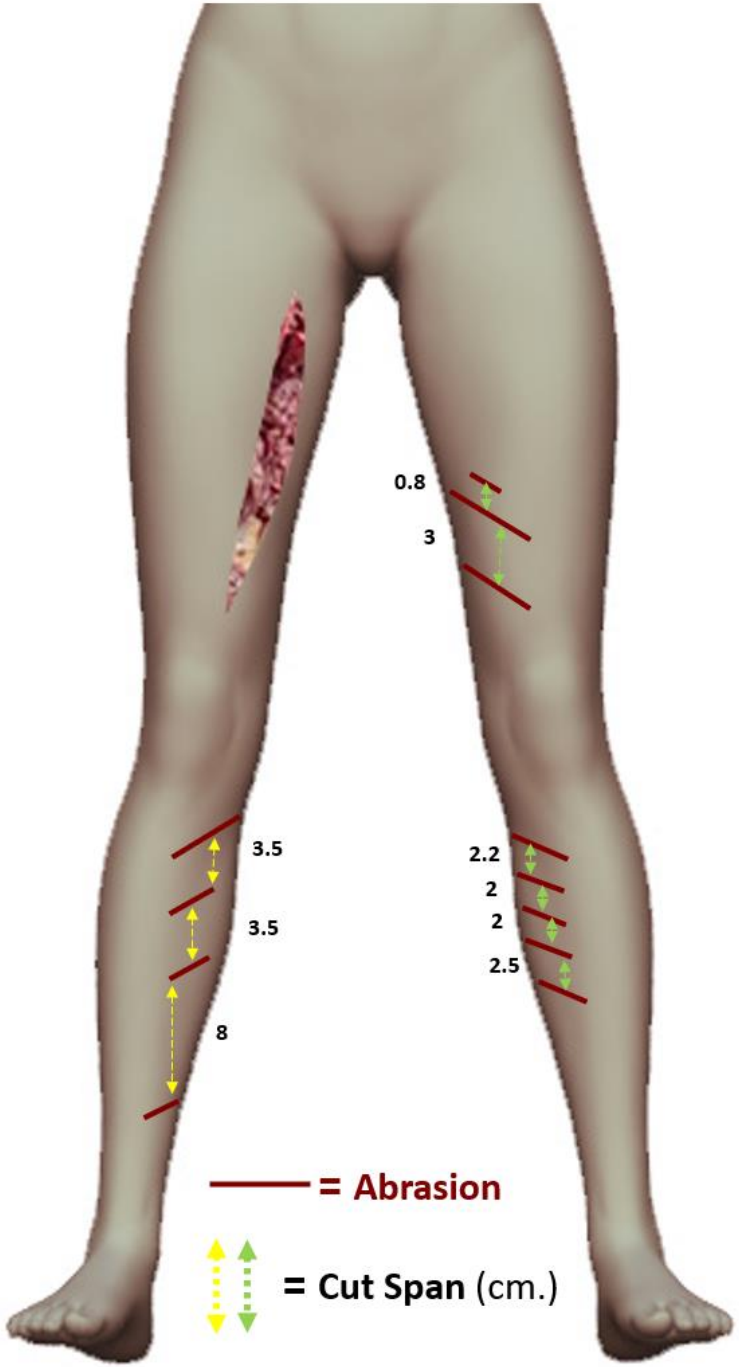
- A wound with fat protrusion on the right popliteal fossa



The police forensic physicians indicated that

- The cause of death was asphyxiation by drowning
- Mud was found in the trachea and bronchial tree
- She was still breathing when she fell into the water source

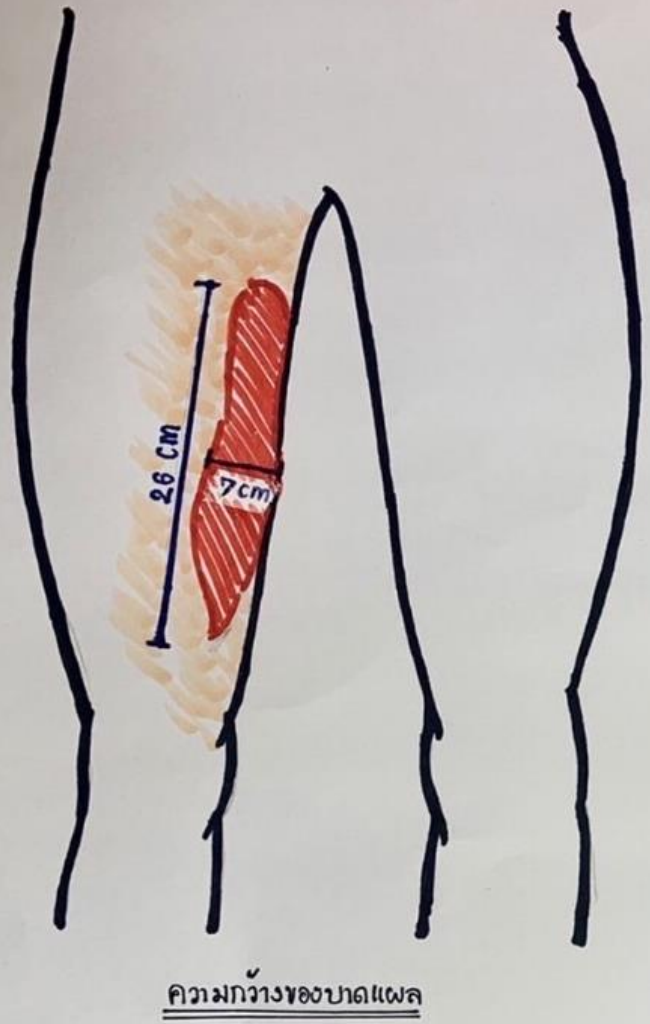


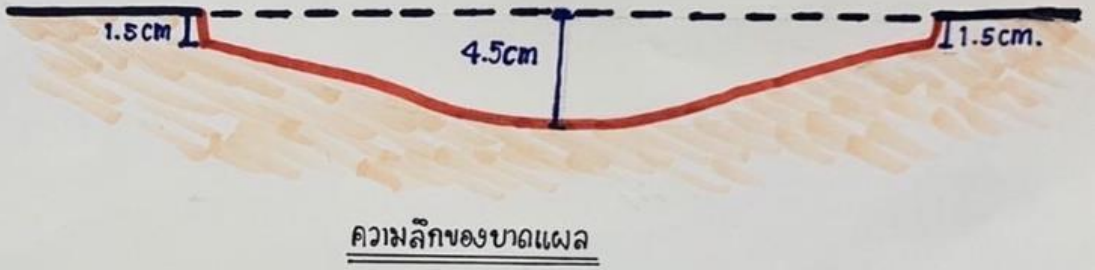


Based on public statement of Provincial Police Region 1

- 26 external wounds appeared
- Antemortem (RBC in tissues)
- ***Largest wound longitudinally***
- ***Abrasions transversally***
- ***Different cut span distances***
- Lacerations at both popliteal
- Bruises on left knee & shin

RIGHT THIGH



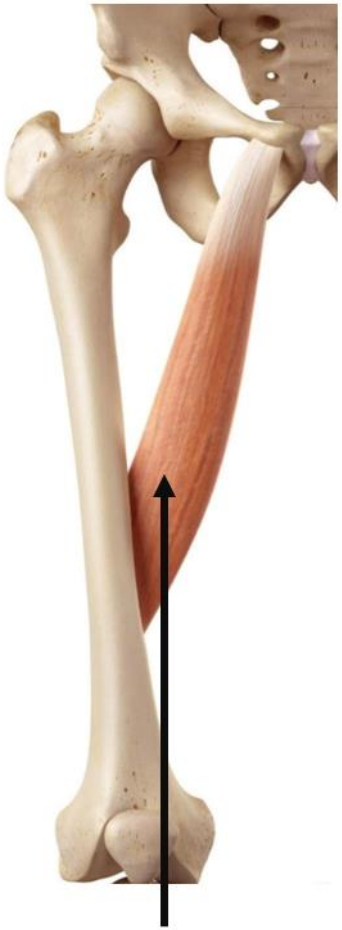


The most surprising wound =
The largest and isolated wound

- On the inner side of the right thigh
- 26 cm in length, 7 cm in width, 4.5 cm in depth

Anatomy of three muscles that were damaged

Gracilis



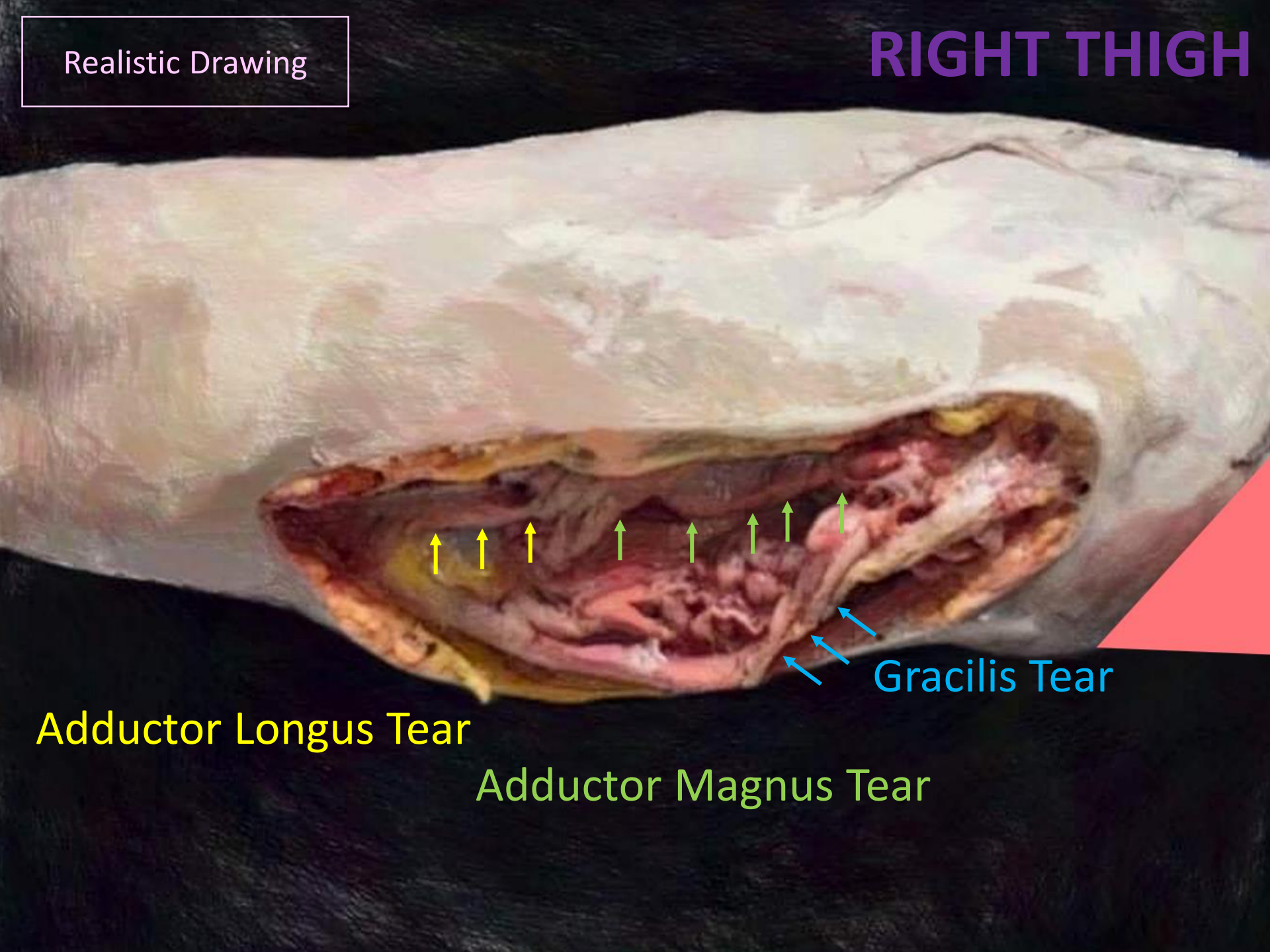
Adductor Longus

Adductor Magnus

(No femoral artery or bone injury)

Realistic Drawing

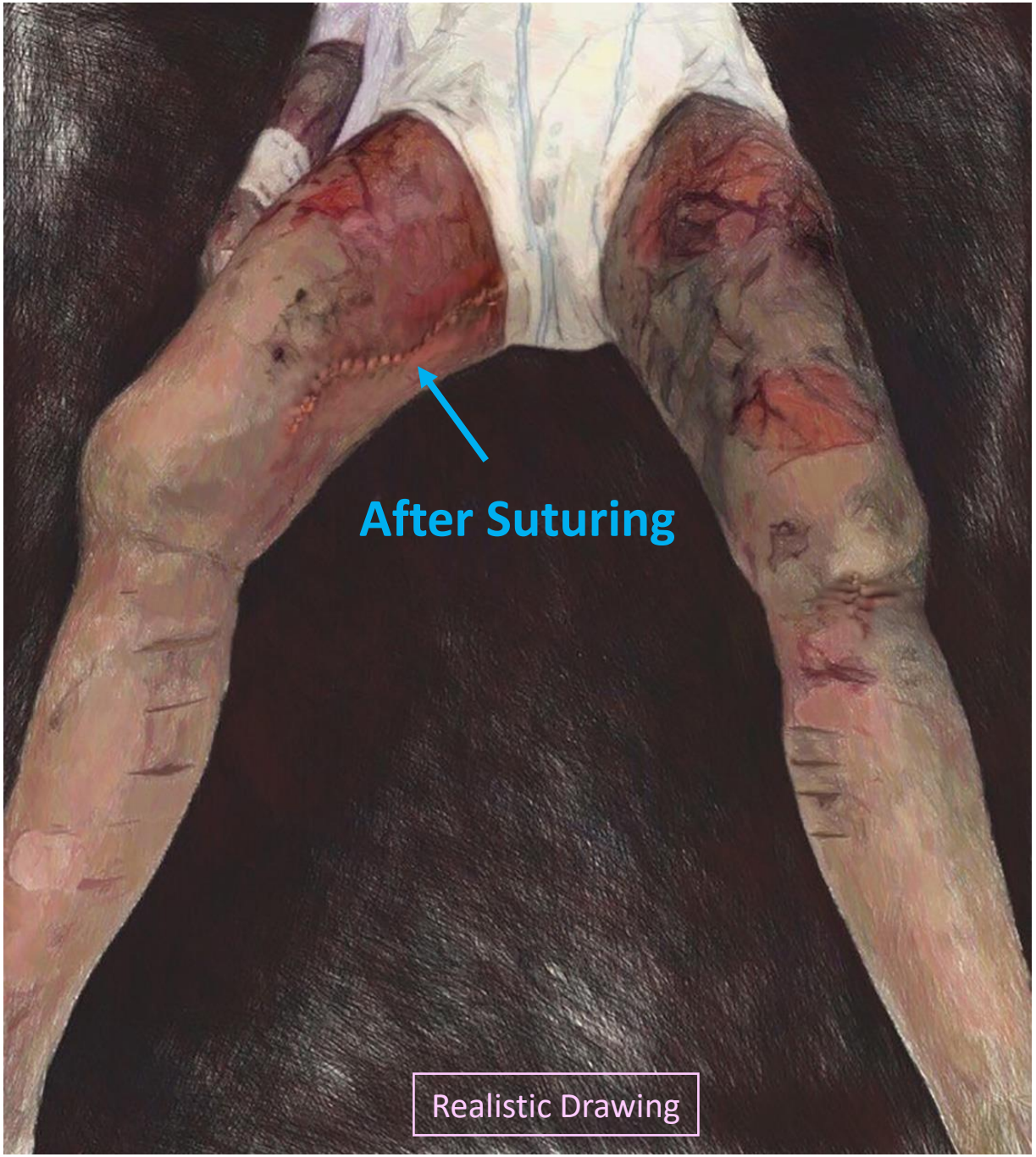
RIGHT THIGH



RIGHT LEG

LEFT THIGH & LEG

Multiple, parallel, **various cut span distances with difference angles**



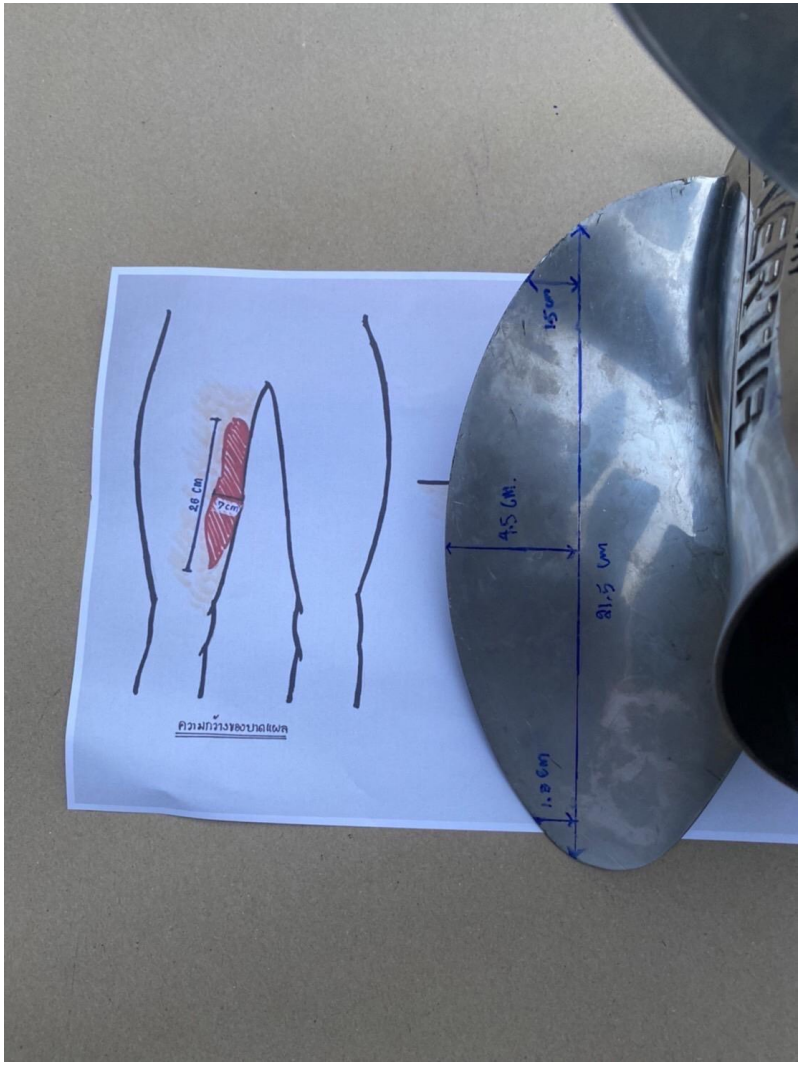
Green S line
Drawn by police

Police's Claim

S-shaped!

After Suturing

Despite measuring and comparing at the static moment, the police concluded that the dimensions of the largest wound matched the dimensions of the propeller blade!

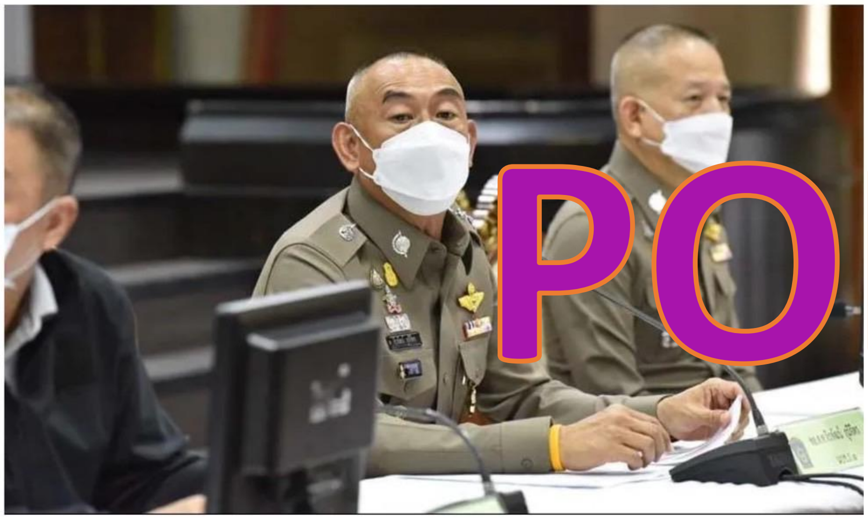


Local News

Police Apologise For Using Foreign Images To Illustrate Tangmo Nida's Wound

April 28, 2022 TNR Staff Comment(0)

April 28, 2022



POLICE DECEPTION

POLICE issued a polo for u g image and thro Google search to ustrat he nd ffered by actress Pataratid atcha ira ng, or T mo Nida, ho drowned during a speedboat trip in Chao Phraya River in Feb. during a press briefing two days ago, Thansettakij and Naewna newspapers said today (Apr. 28).

Netizens reviewed the images used in the video clip to show that the wound Tango Nida suffered on her inner thigh was comparable to the speedboat's propeller.

They discovered that these images were in fact published by The Sun newspaper and were of a wound suffered by a 21-year-old woman who got injured while dancing at a party in September 2019. However Staffordshire police had said at the time that they did not know how she got wounded in this manner and were still investigating the incident.

This afternoon Pol. Lt. Gen. Chiraphat Phumchit, head of the Provincial Police Region 1, led a team of policemen in explaining at a press conference that the staff had been allowed to make a vide lip on th topsy lt.

Pol. . W chart Saer ead of investigation division of Prov ial ce Region aid foreign images were used ca legal is l the use of images of real wounds, with the one in question being concave S-shaped.

He added that the public could Google search and see various propeller wounds and study their characteristics. They could re rch d ma mpa ons.

lice ca misrep en cts and ce rk c inised by social me We ap gis r usin age ith erring to the source with this resulting in an incomplete presentation of information and ambiguity.

"This led to the media having doubts but the intention was to compare the wound with only images of S-shaped wounds being usable," he said.

CAPTION:

Unknown woman's wound

Tangmo's wound

During public broadcasting, the police showed a S-shape sutured wound of unknown woman ***lying that was caused by a propeller similar to the wound on Tangmo's thigh***

thesun.co.uk

THE Sun | ALTH | DEAR DEIDRE | TECH | TRAVEL | MOTORS | PUZZLES

A YOUNG woman was left with a horrific 30cm gash on her leg in a mystery incident during a farmers' ball.

The 21-year-old suffered the gaping wound to her leg at the dinner dance event at Tillington Hall Hotel, Stafford, on Friday, September 20.

Netizens discovered that the image was in fact *of a woman who got* ***a cut while dancing at a party***

The extraordinary Cadaveric Test for Inter-Evidence Compatible

Credited to Pol. Col. Napaphat Natthasumon

The Institute of Forensic Medicine, Royal Thai Police

Cadaveric Test for Inter-Evidence Compatibility

- **Contamination of the chain of custody** and **different axis of the propeller rotation**
- Divided the test into two shots, one side by one side, **not 2 sides simultaneously**

(POLICE) **CONCLUSION**

- Tangmo's death was an accident, not homicide
- Caused by "recklessness" of someone on the boat
- Fell from the stern of the "moving forward" boat
- Hit by the propeller before drowning

QUESTIONS

ANSWERS

JUSTICE

FOR ALL

MANKIND

THANK YOU