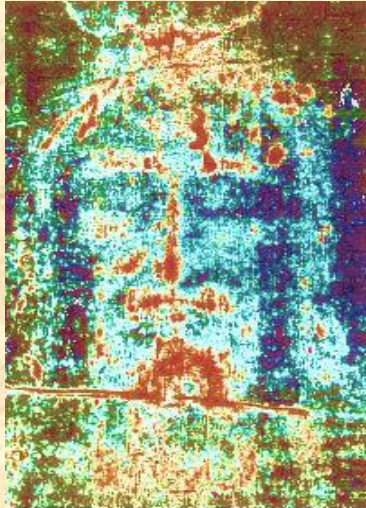


Blood on the Shroud of Turin: Species Unknown



The very first blood studies on the Shroud were performed by Frache & colleagues in the early 1970s

F
-



1970

1980

1990

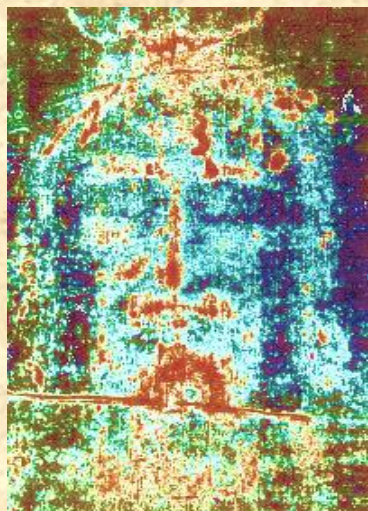
2000

2010

2020

Blood Studies on the Shroud

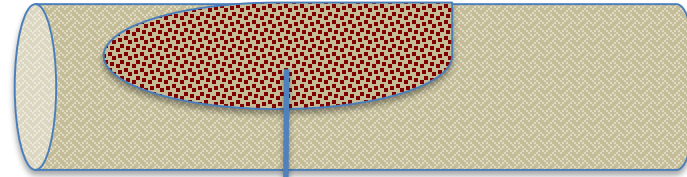
Their results were negative



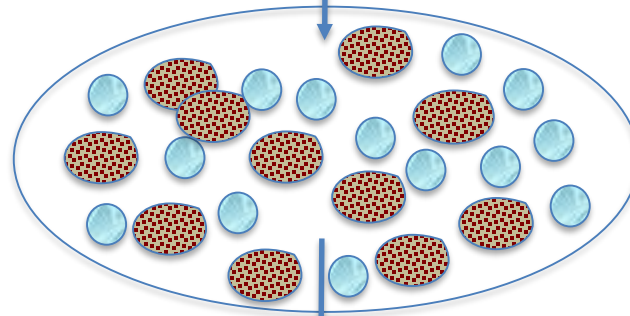
Blood Studies on the Shroud

Aged Bloodstains

Bloodstained fiber



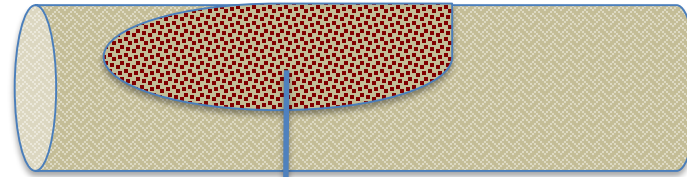
Solubilization



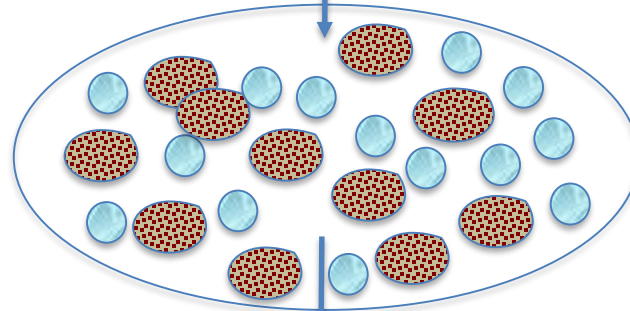
Test

Aged Bloodstains

Bloodstained fiber



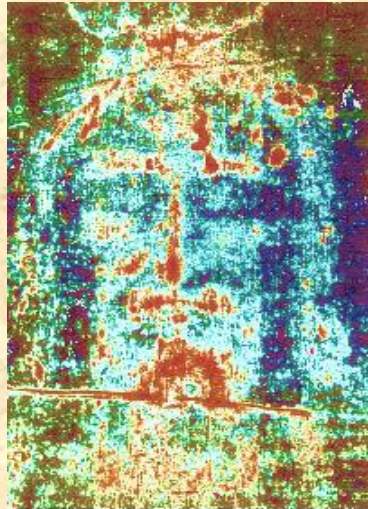
~~Solubilization~~



Test

“[The negative answer does not permit an absolute judgement of the hematic nature of the material under examination]”

F



1970

1980

1990

2000

2010

2020

Blood Studies on the Shroud



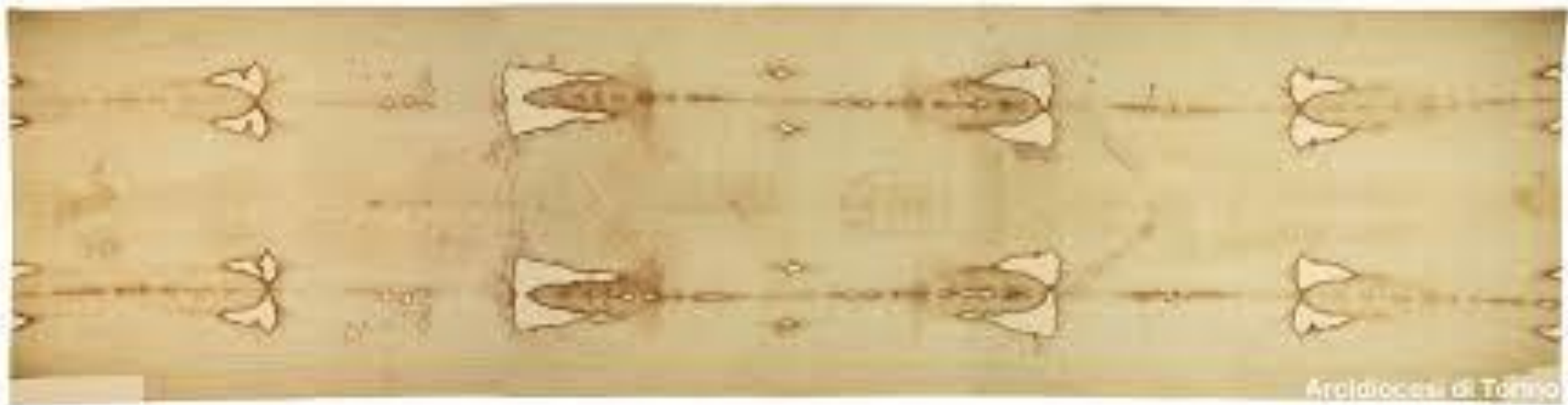
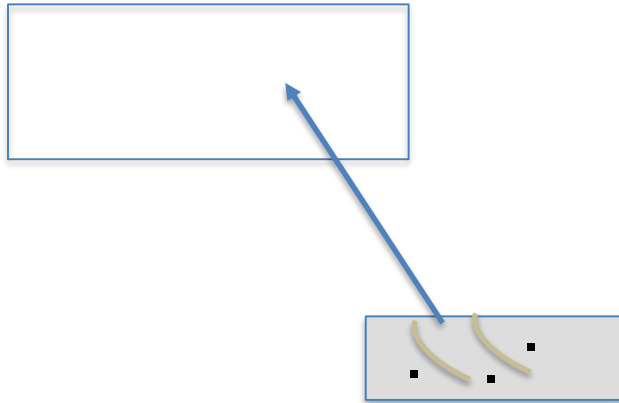
**In 1978 Shroud samples were collected
by:**

**STURP team
Baima Bollone**

Collection Methods

STURP

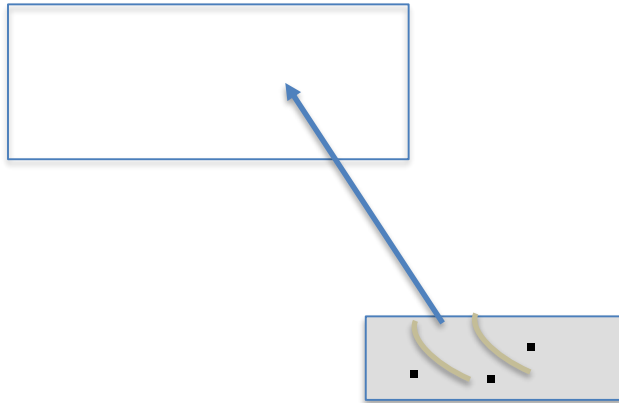
Surface tape-lifts



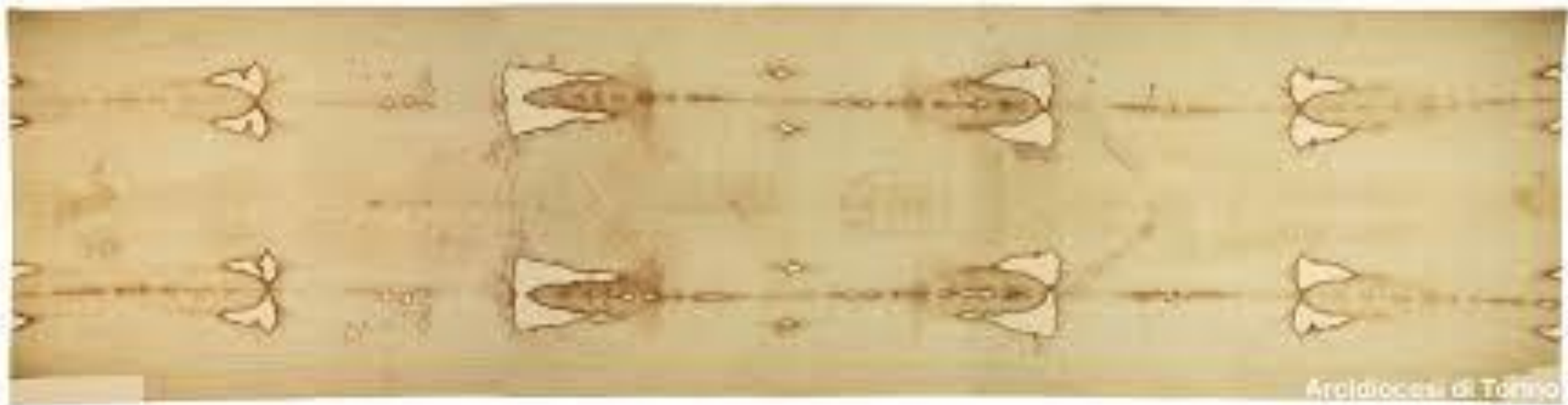
Collection Methods

STURP

Surface tape-lifts

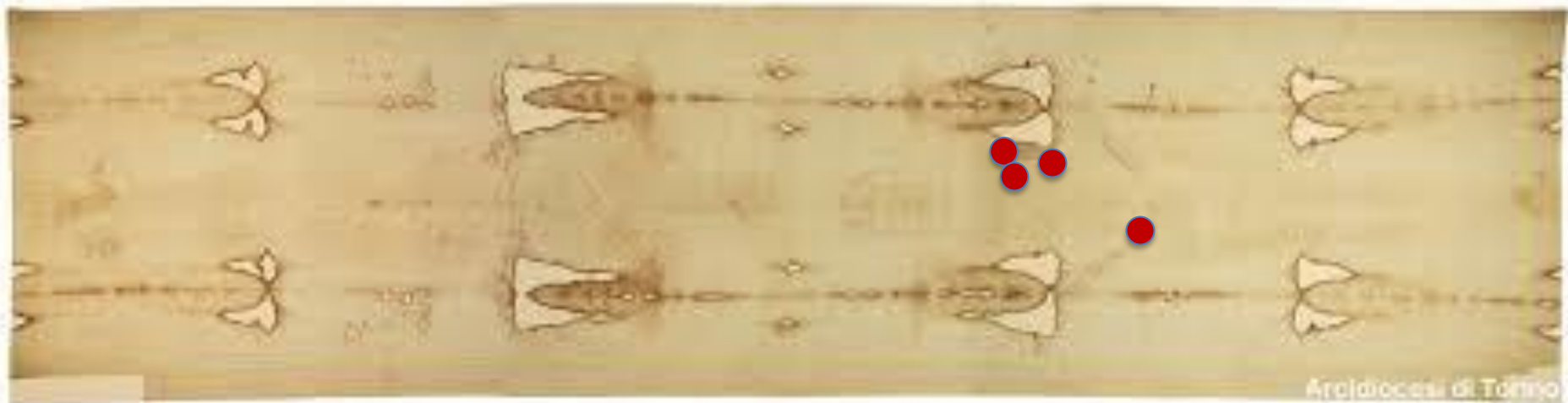
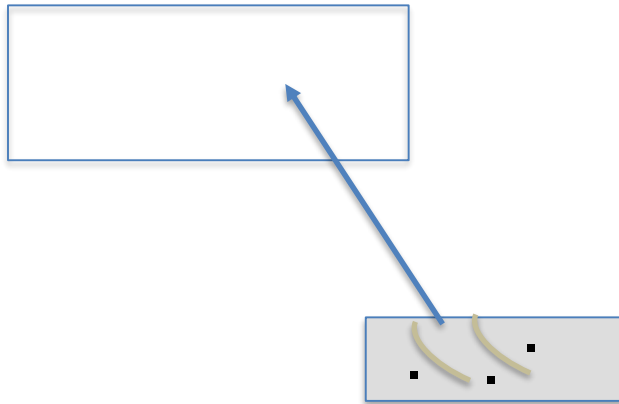


Baima Bollone
Forceps: removal of
certain threads



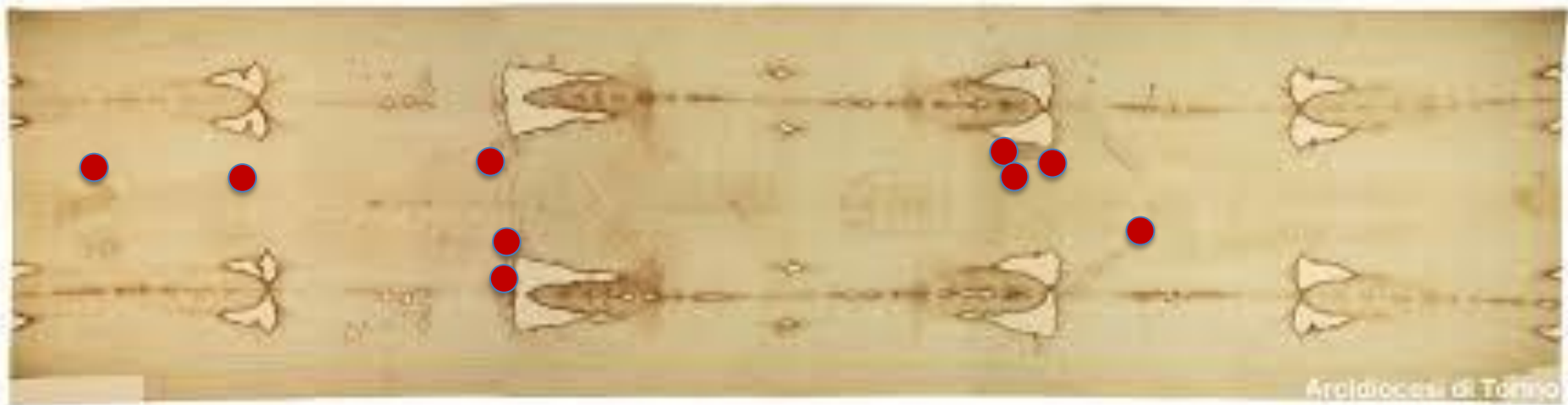
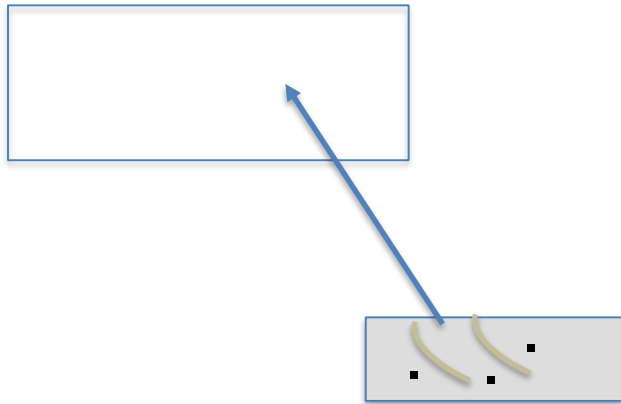
Collection Methods

STURP
Surface tape-lifts



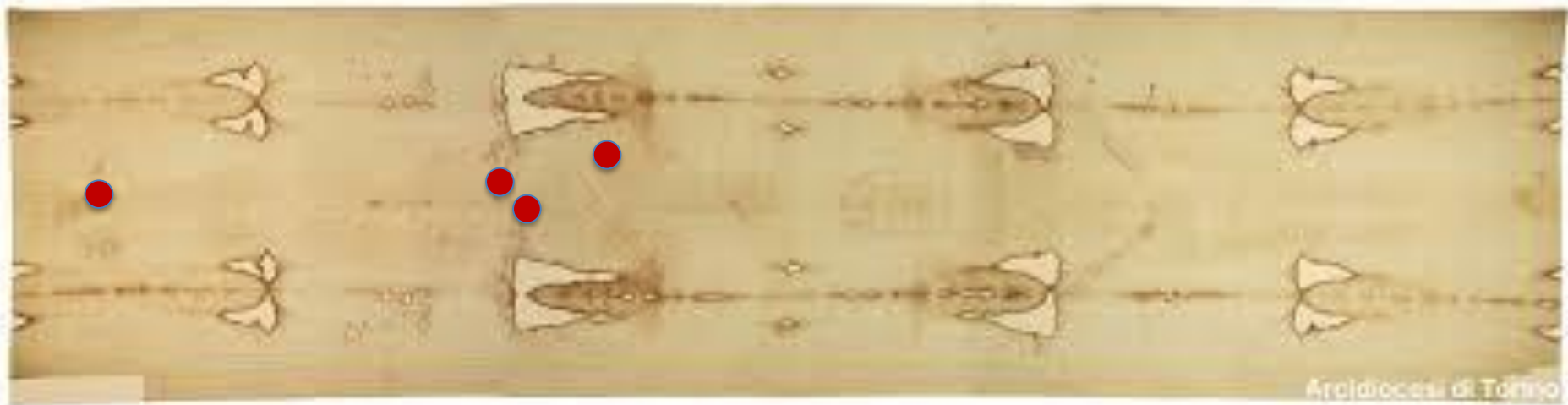
Collection Methods

STURP
Surface tape-lifts



Collection Methods

Baima Bollone
Forceps: removal of
certain threads

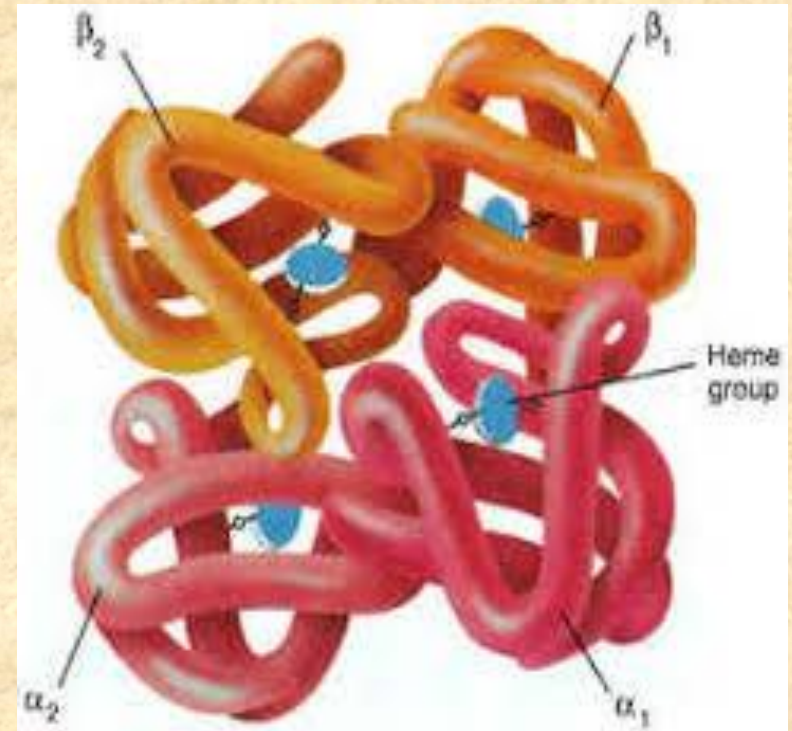




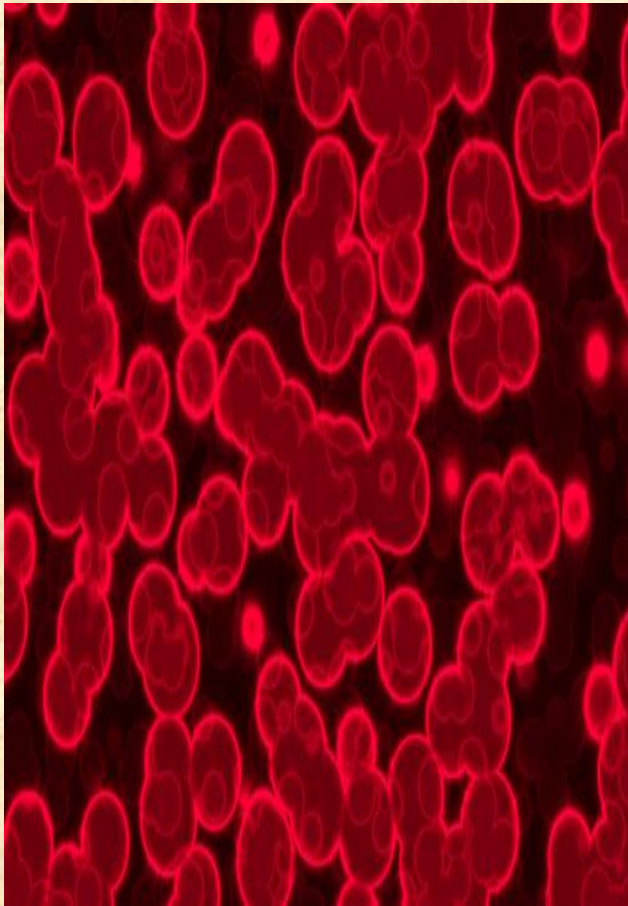
To date, this remains the most detailed investigation of the Shroud bloodstains

Almost all of the reported analyses of the characterization of the bloodstains are based on these data

Is blood really present?

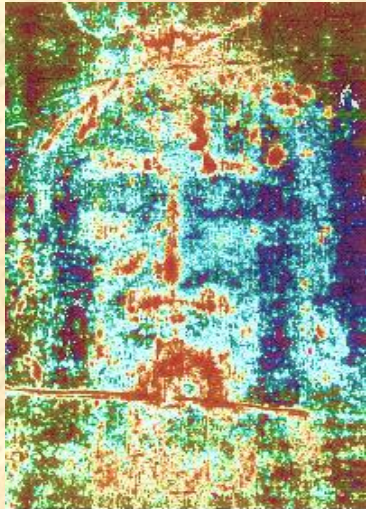


**The signature molecule for blood
Is Hemoglobin**



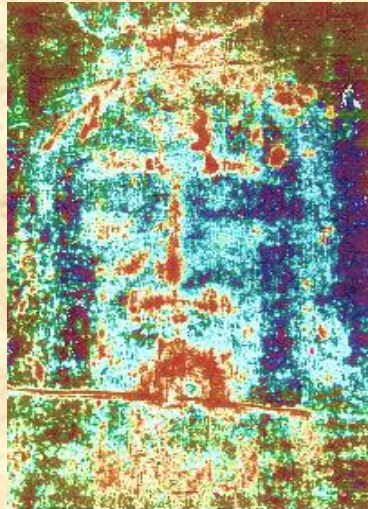
**A single RBC contains
~ 250 million Hb molecules**

Detection of Hemoglobin (Heme)



Chemical Methods

Detection of Hemoglobin (Heme)



Spectroscopy Methods

*breakdown products: biliverdin, bilirubin
(Chemical methods)

What type of blood is it?

Immunological Methods

Species: Animal, Human

Blood type: A, B, AB, O

DNA Methods

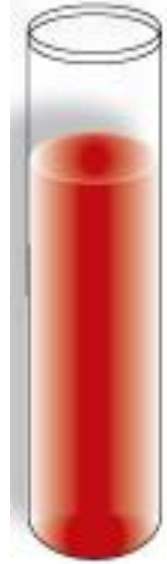
Above plus if Male or Female



**The blood on the Shroud is
widely reported as Human in origin**

Immunological Methods

**Use specific antibodies as probes
for the molecule of interest**

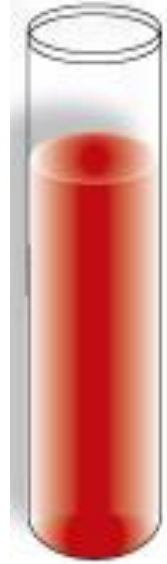


Whole
Blood



Plasma

Cells

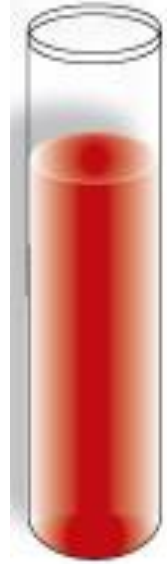


Whole
Blood



Plasma → Proteins

Cells



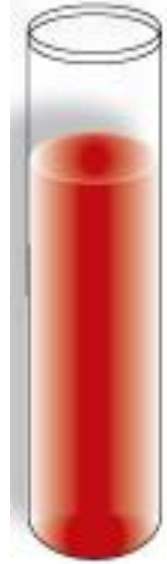
Whole
Blood



Plasma → Proteins

Cells





Whole
Blood



Plasma



Proteins

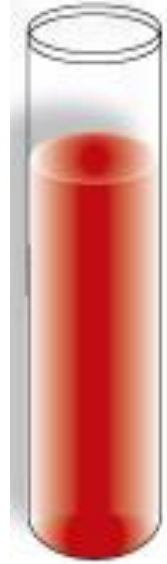
Cells



Albumin



Antibody



Whole
Blood



Plasma



Proteins

Cells



Albumin



Antibody

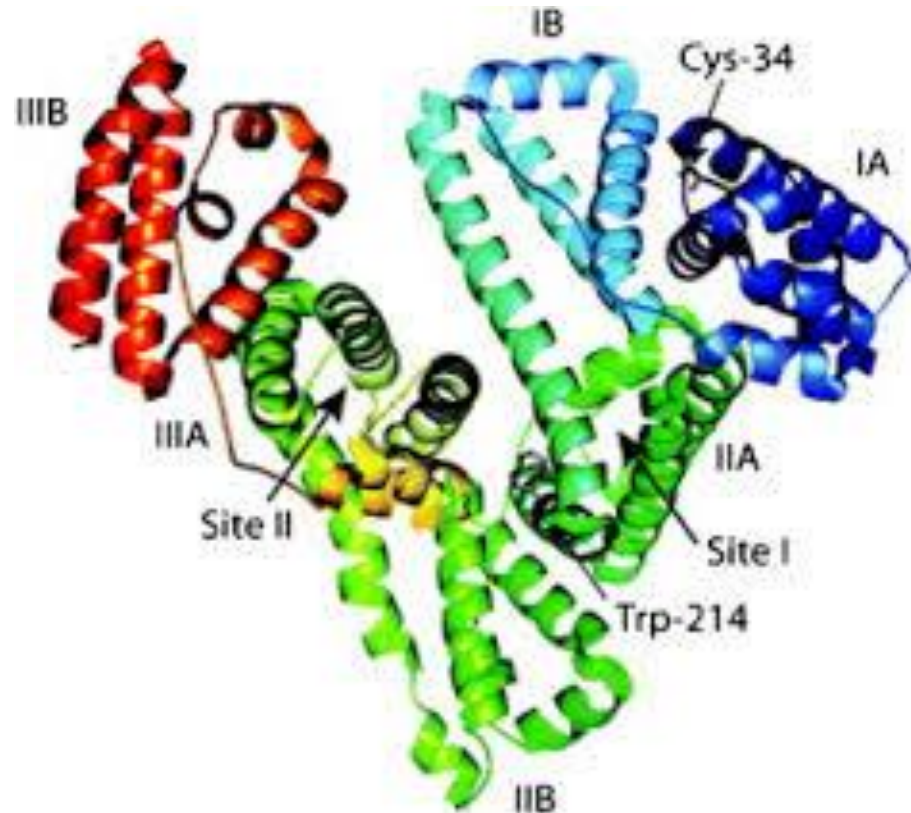


Albumin

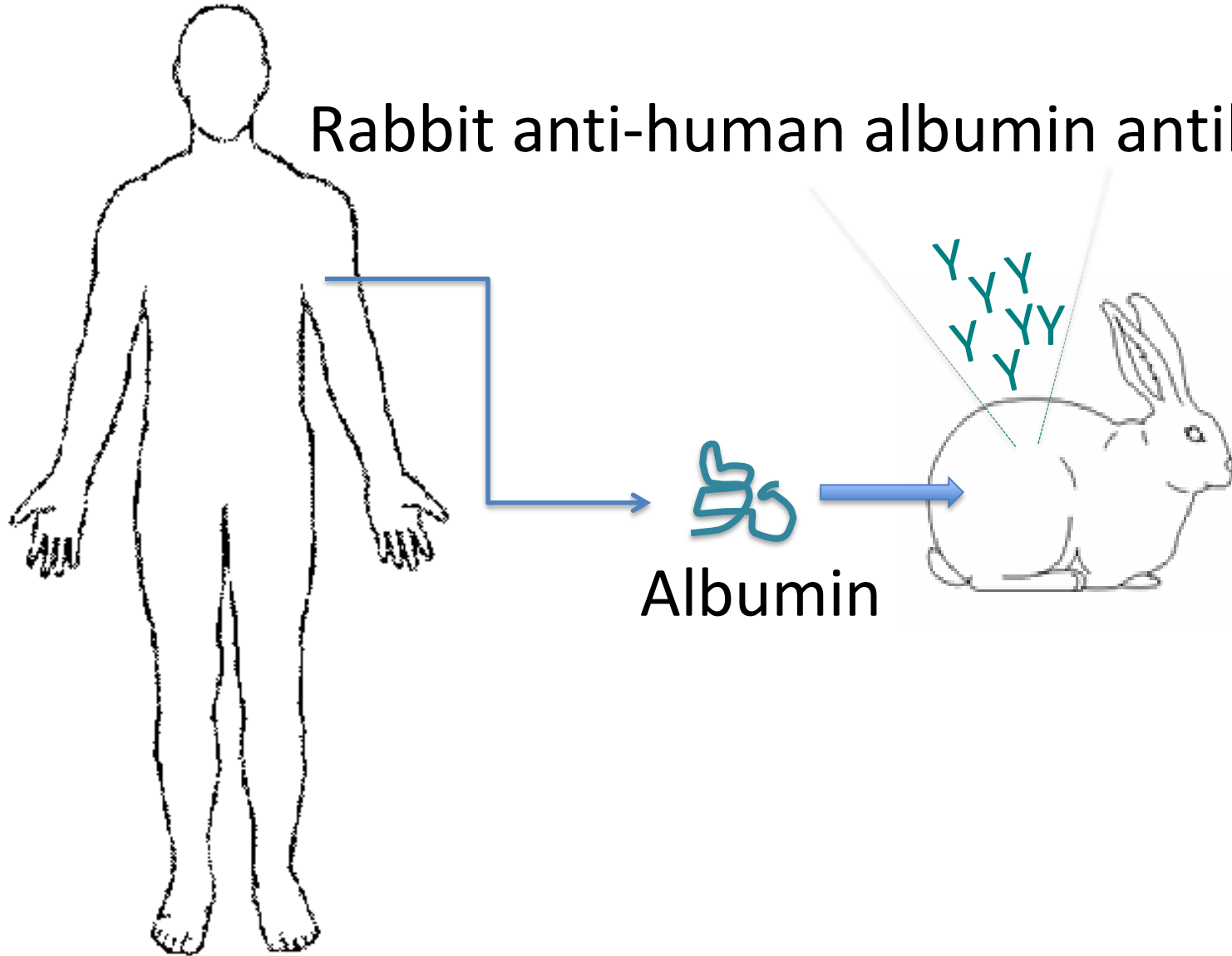
Major protein (~55-60%) in blood

Maintains osmotic pressure of extracellular fluid

Carrier protein for many ligands (fatty acids, hormones)

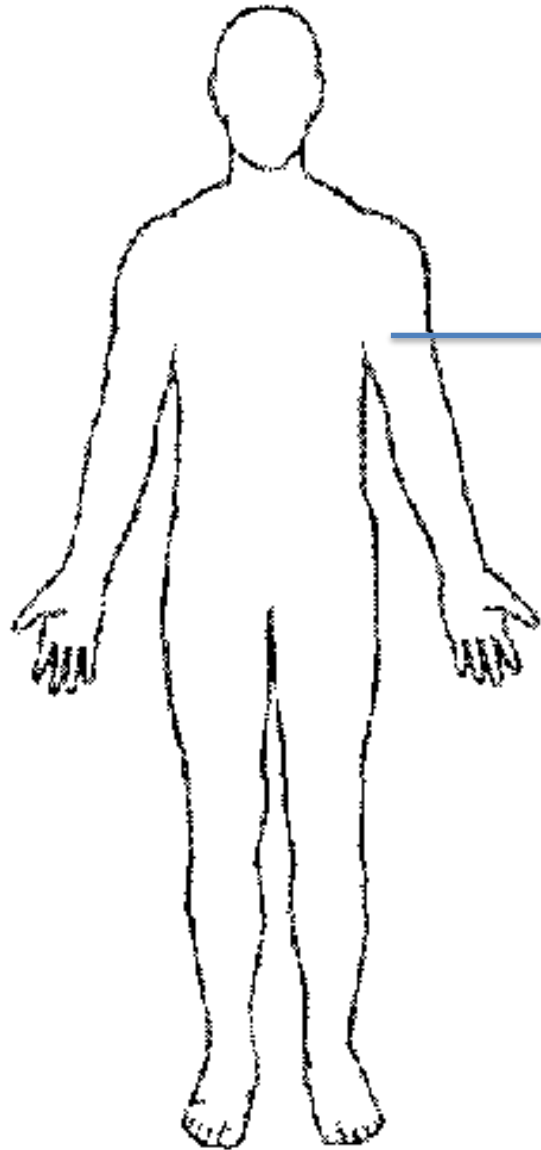


Rabbit anti-human albumin antibodies

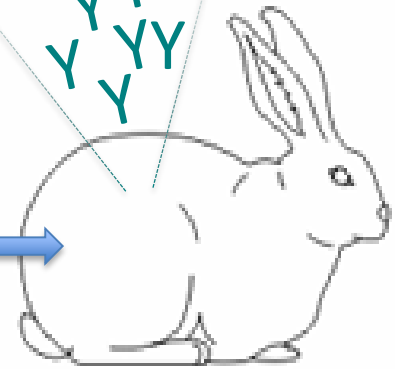


Made in against (specific for)

Rabbit anti-human albumin antibodies



Albumin



Immunohistochemistry



Antibody

Immunohistochemistry

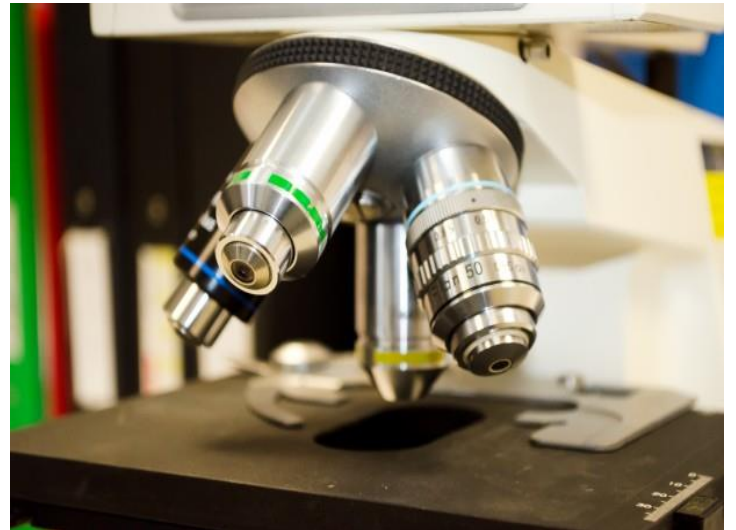
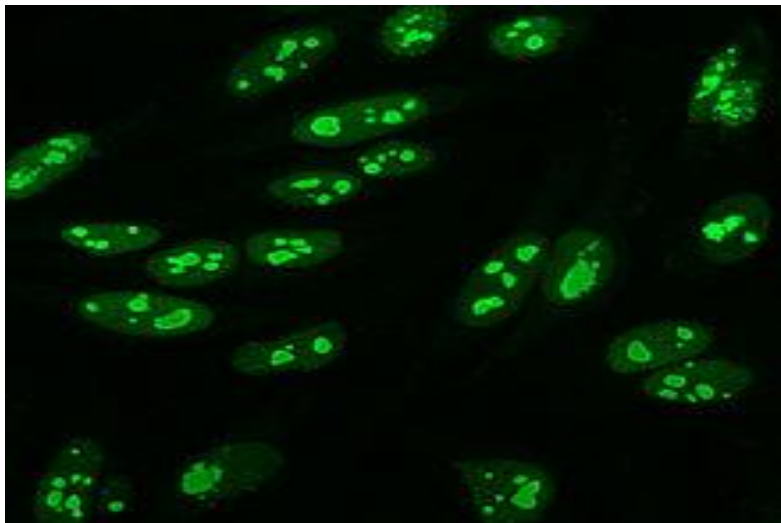


Antibody
Labeled with Fluorescent Tag
or Chemical Tag

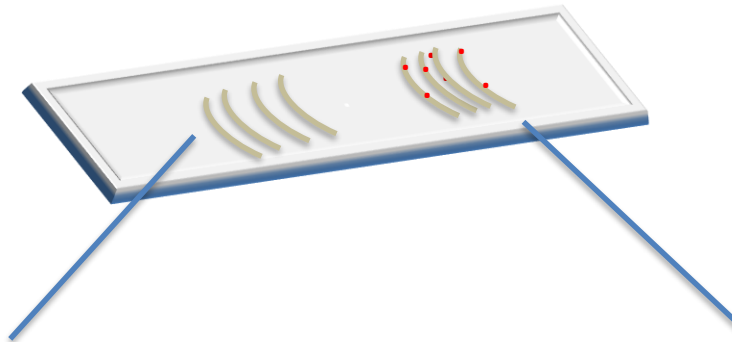
Immunohistochemistry



Antibody
Labeled with Fluorescent Tag
or Chemical Tag



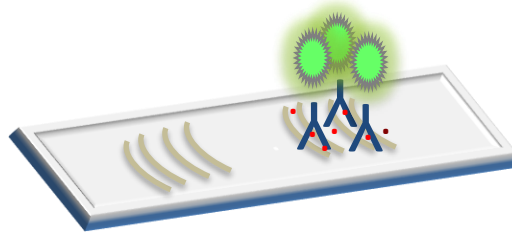
Immunohistochemistry



Unstained
fibers
(control)

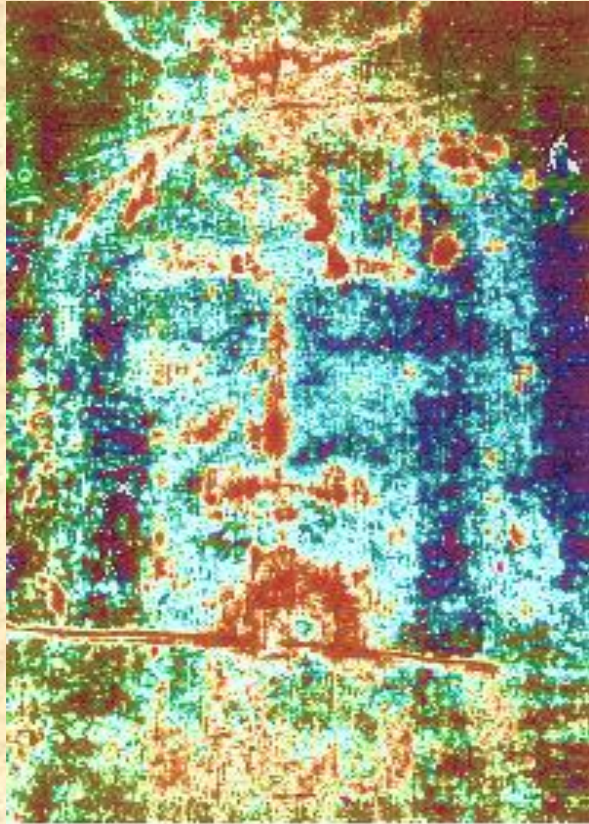
Bloodstained fibers

Immunochemistry



Control fibers: Negative
Bloodstained fibers: Positive

Results suggest albumin is
present in bloodstained fibers



What type of blood is it?

Anti-human albumin

Cross-Reactivity



Human

Other Species

Antibodies made against human proteins
may recognize the same protein
found in other species

Cross-Reactivity

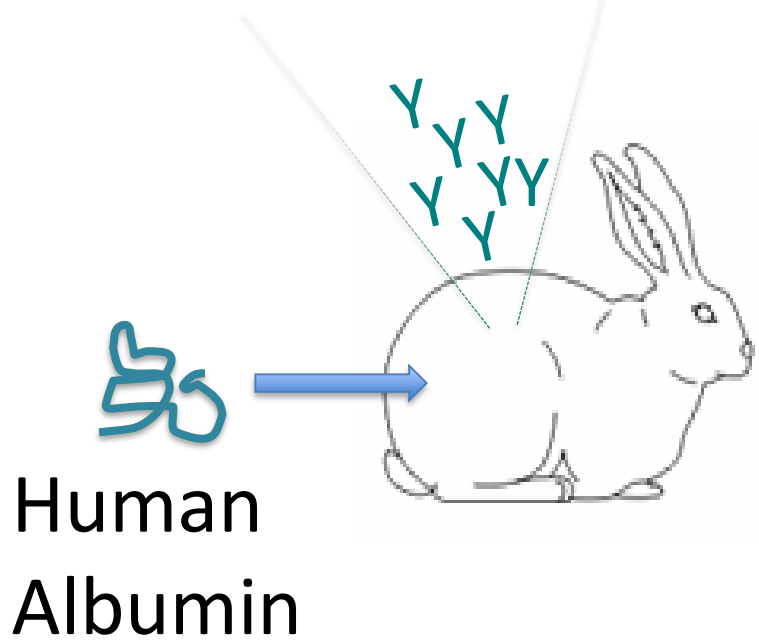








Human

Other Species

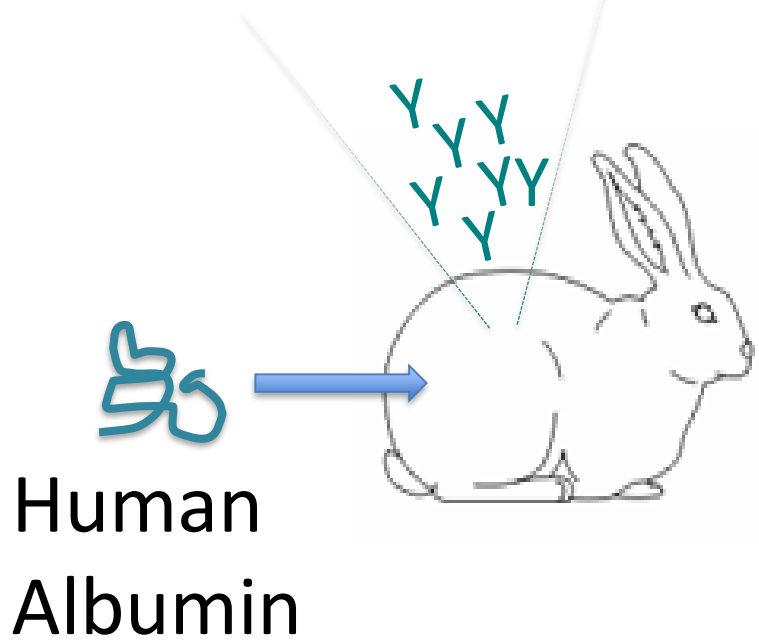
Must be experimentally verified
in separate tests before making any conclusions

Rabbit anti-human albumin



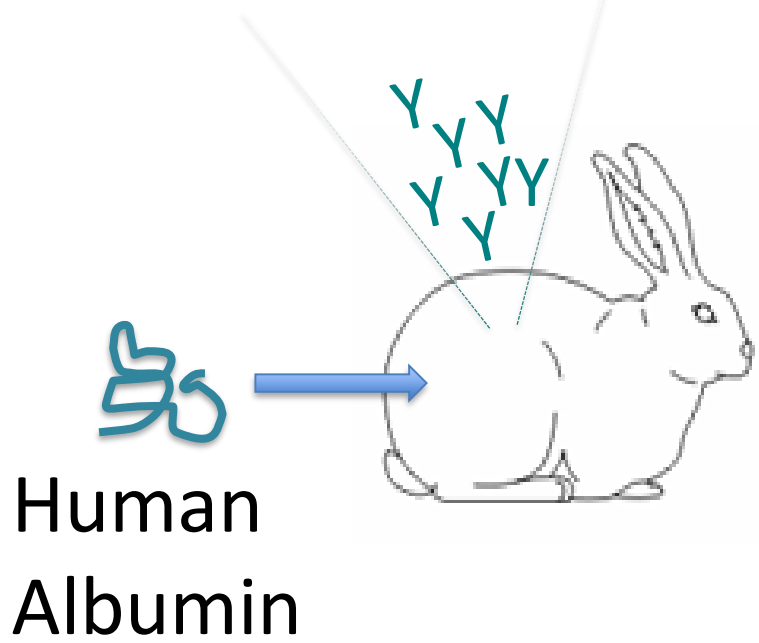
- ✓   Human Albumin
-  Chimp Albumin
-  Baboon Albumin
-  Cow Albumin
-  Horse Albumin

Rabbit anti-human albumin



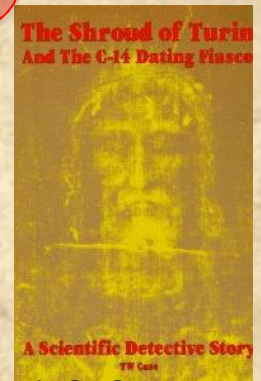
- ✓  Human Albumin
- ✓  Chimp Albumin
-  Baboon Albumin
-  Cow Albumin
-  Horse Albumin

Rabbit anti-human albumin



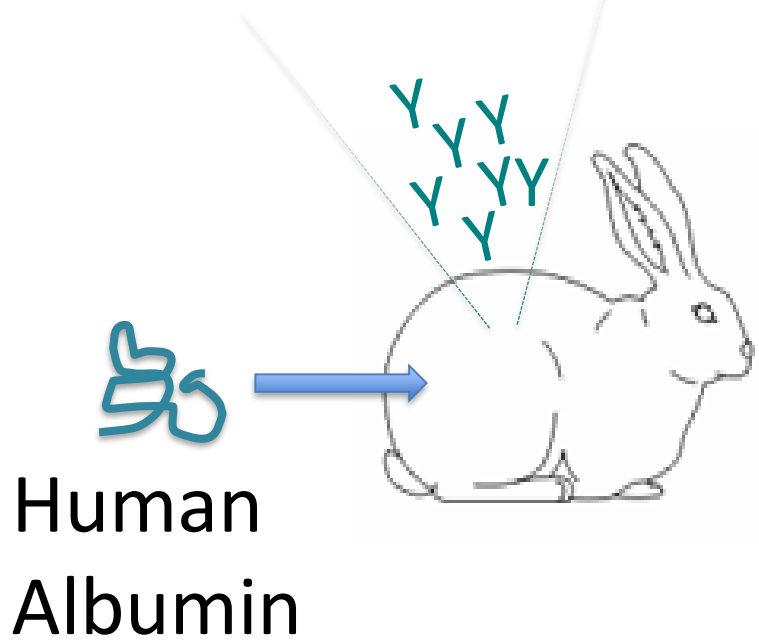
- ✓  Human Albumin
- ✓  Chimp Albumin
- ✓  Baboon Albumin
-  Cow Albumin
-  Horse Albumin

But the most interesting thing is now there is immunological evidence that it is primate blood.”



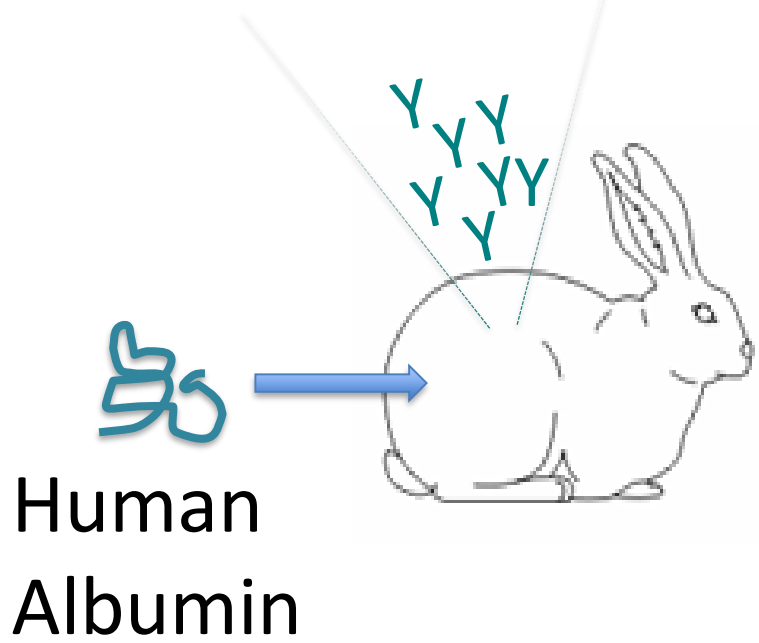
-Heller & Adler interview 1995

Rabbit anti-human albumin



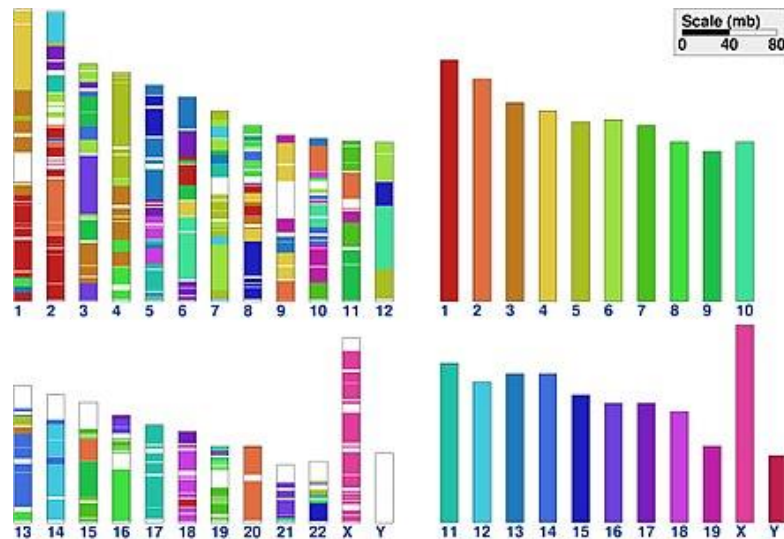
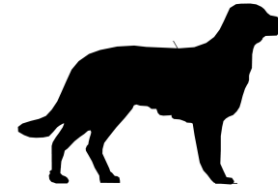
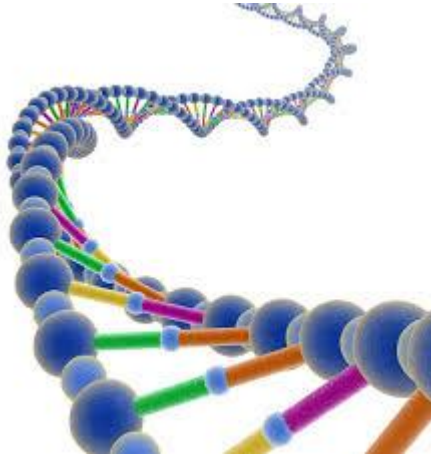
- ✓  Human Albumin
- ✓  Chimp Albumin
- ✓  Baboon Albumin
-  Cow Albumin
-  Horse Albumin

Rabbit anti-human albumin

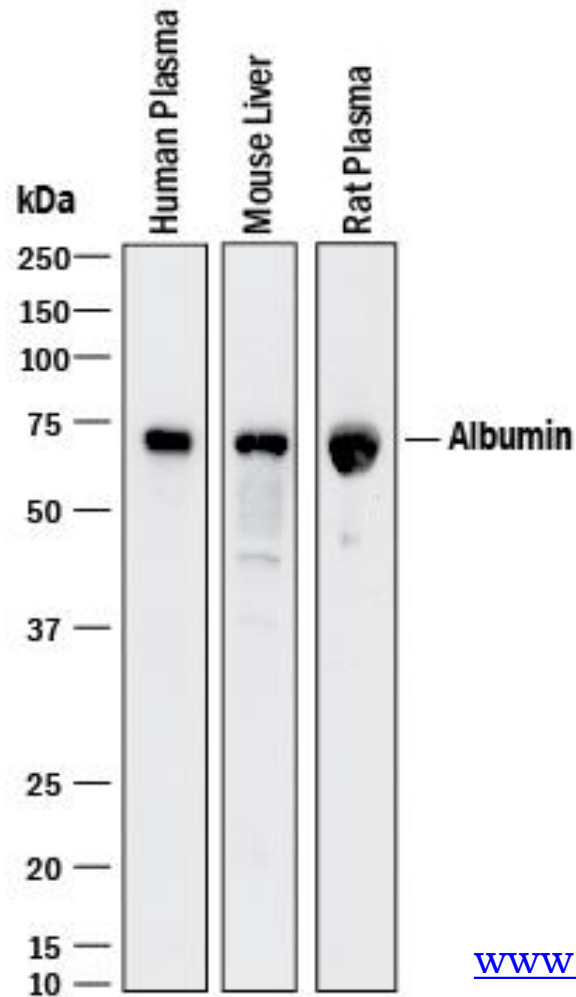


- ✓  Human Albumin
- ✓  Chimp Albumin
- ✓  Baboon Albumin
-  Cow Albumin
-  Horse Albumin

It is now known that albumin from other animals (not examined) are very similar to human albumin

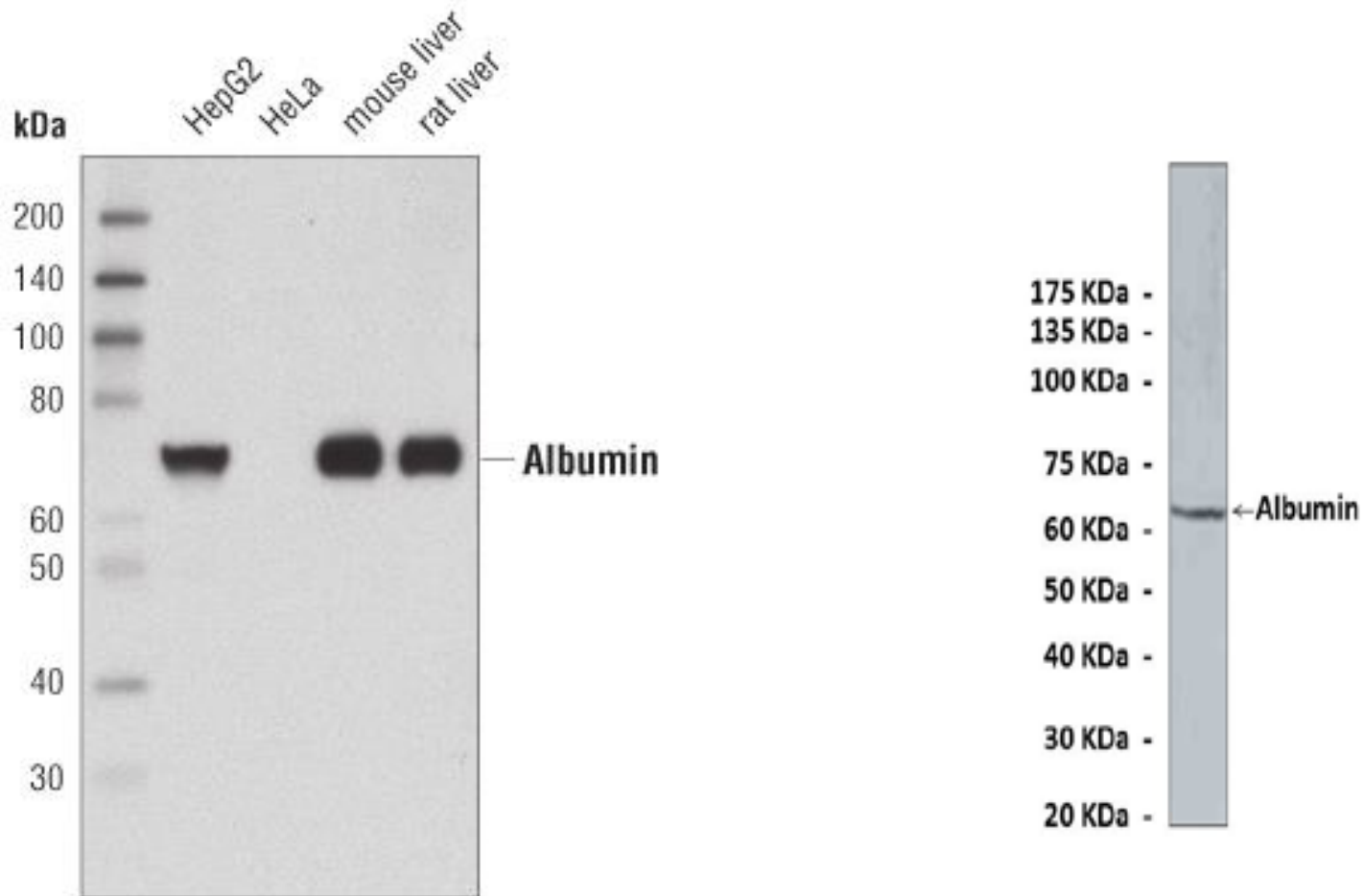


Cross-reactivity
is much greater than previously considered



Cross-reactivity

is much greater than previously considered



<https://www.cellsignal.com/products/primary-antibodies/albumin-antibody/4929>

Luo, et al., Journal of pharmacology and experimental therapeutics, 321: 884-891 (2007).

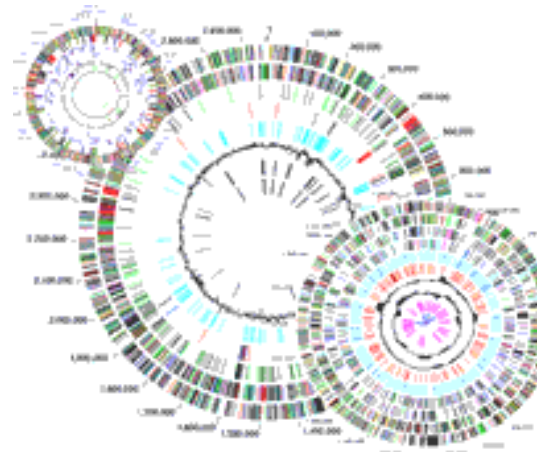
G3

Genes | Genomes | Genetics

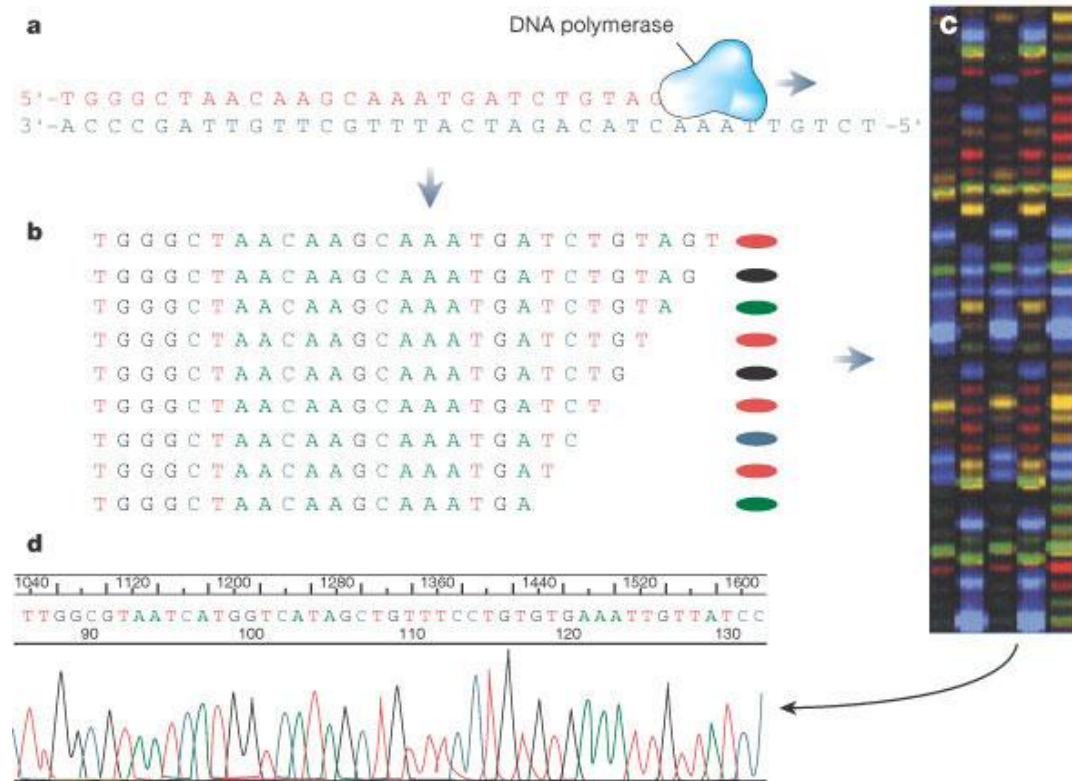


GSA
Genetics Society of America

MARCH 2018
VOLUME 8 • ISSUE 3
www.g3journal.org



Immunoreactivity of other species is corroborated by genetic/protein sequencing data





Peer Reviewed

Human Albumin Therapy in Hypoalbuminemic Dogs

Michelle Savigny, DVM

Resident, Emergency and Critical Care

Douglass K. Macintire, DVM, MS, DACVIM, DACVECC

Professor

Department of Clinical Sciences

College of Veterinary Medicine

Auburn University

Albumin is a crucial protein in the body, comprising approximately half of the plasma total protein. Albumin is synthesized exclusively by the liver. Under normal conditions, production occurs at one-third maximum capacity, meaning that in times of need, the liver has reserve capacity to increase albumin production. Stimulus for production is mainly the colloid osmotic pressure (COP) of the blood, but other factors, such as nutritional state, intracellular potassium, and certain hormones, also play a role.

Synthetic substances such as hetastarch and dextrans can also be recognized by the hepatic osmoreceptors and affect albumin synthesis. If these synthetic substances are used to increase COP to or above a normal level (20–40 mm Hg), they can actually turn off the signal to the liver to produce more albumin. Degradation occurs at a rate directly related to concentration, with decreased degradation in times of hypoalbuminemia. Forty percent of the body's albumin is intravascular; the remaining 60% is interstitial. As albumin levels decrease, the intravascular supply is maintained at the expense of the interstitial supply. However, as hypoalbuminemia begins to correct

Editorial Mission

To provide busy practitioners with concise, peer-reviewed recommendations on current treatment standards drawn from published veterinary medical literature.

This publication acknowledges that standards may vary according to individual experience and practices or regional differences. The publisher is not responsible for author errors.

Reviewed 2015 for significant advances in medicine since the date of original publication. No revisions have been made to the original text.

Editor-in-Chief

Douglass K. Macintire, DVM, MS, DACVIM, DACVECC

Editorial Review Board

Mark Bohling, DVM
University of Tennessee



[Vet Clin North Am Small Anim Pract.](#) 2008 May;38(3):595-605, xi-xii. doi: 10.1016/j.cvsm.2008.02.004.

The therapeutic use of 25% human serum albumin in critically ill dogs and cats.

Mathews KA¹.

Author information

Abstract

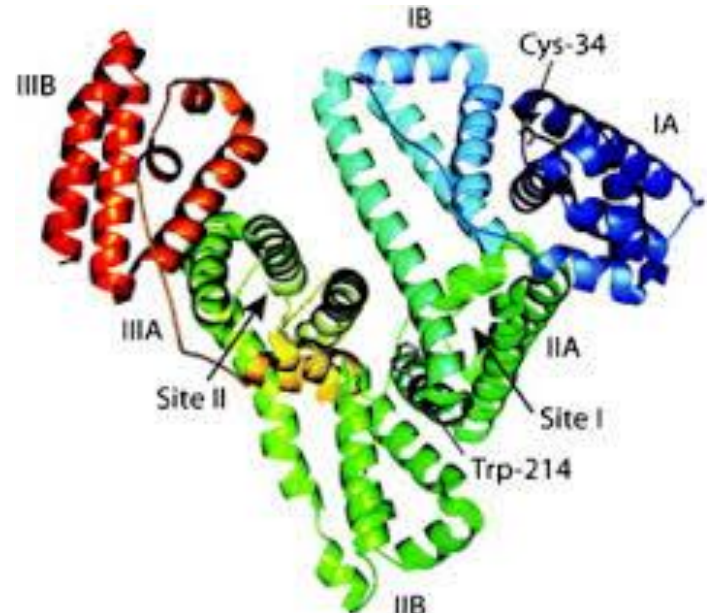
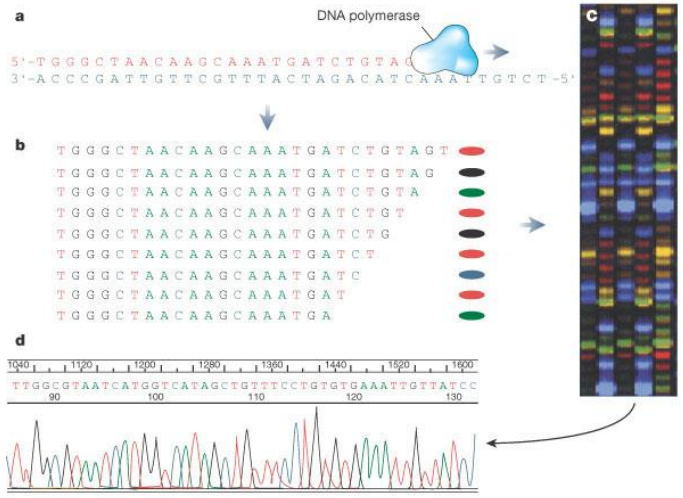
Twenty-five percent human serum albumin (HSA) is a foreign protein and can potentially cause immune-mediated reactions. For this reason, the author only recommends 25% HSA use after risk analysis shows that the benefits outweigh the potential risks of adverse events. If it is apparent that a critically ill animal may succumb to its illness because of the problems associated with severe hypoalbuminemia, the benefit outweighs the risk. The veterinarian must inform the owner of potential delayed immune-mediated reactions, describe these lesions, and follow the case weekly to ensure that no reaction has occurred. Although there are many positive attributes to the administration of 25% HSA, there seems to be specific situations in which 25% HSA may be indicated and others in which it may not be indicated.

PMID: 18402884 DOI: [10.1016/j.cvsm.2008.02.004](#)

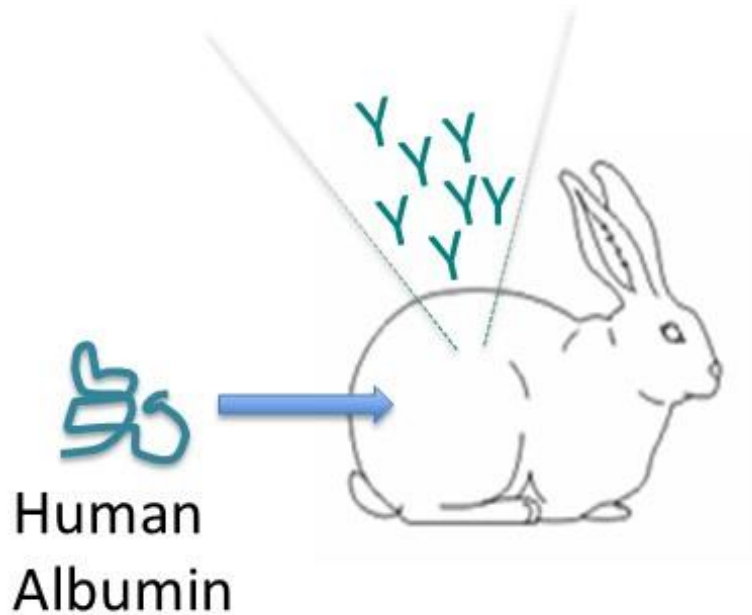
[Indexed for MEDLINE]



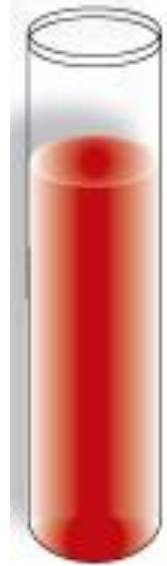
Cat albumin shows high homology to human albumin



Rabbit anti-human albumin



- ✓  Human Albumin
- ✓  Chimp Albumin
-  Cow Albumin
- ✓  Rat Albumin
- ✓  Cat Albumin
- ✓  Others



Whole
Blood



Plasma



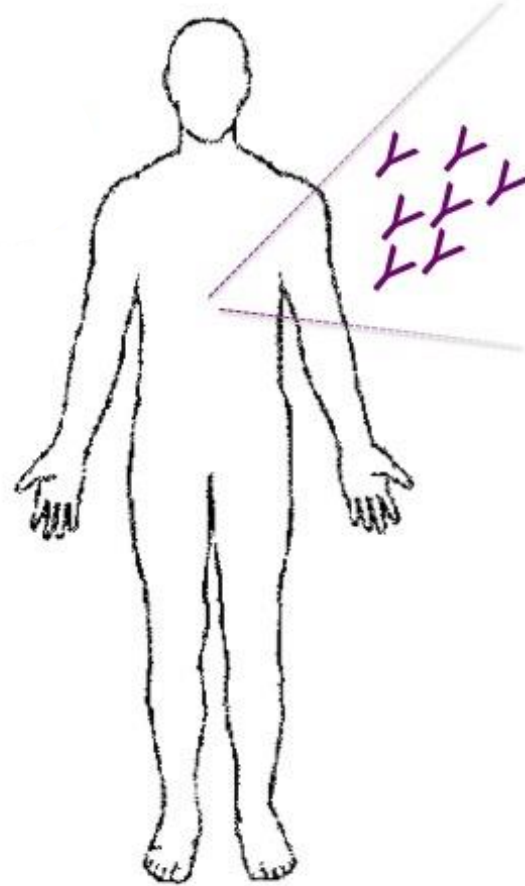
Proteins

Cells



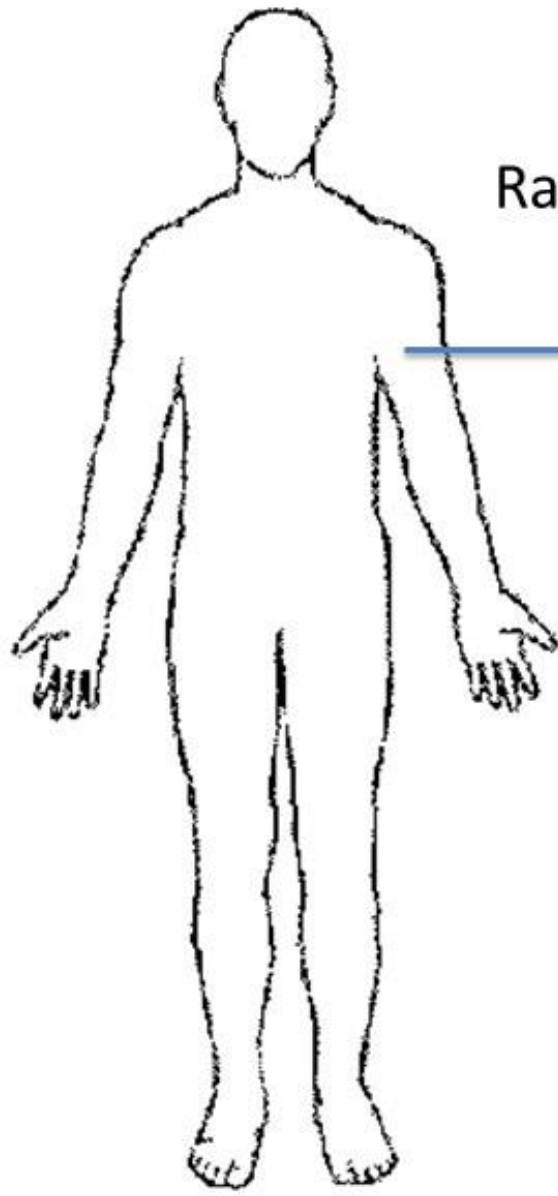
Albumin

Antibody



IgG
IgM
IgA
IgD
IgE

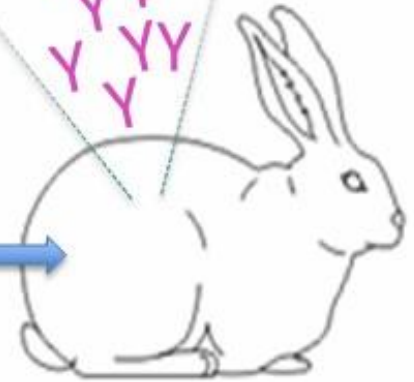
Antibody = Immunoglobulin (Ig)
~ 18% total serum protein



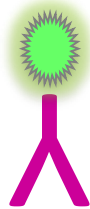
Rabbit anti-human immunoglobulin antibodies



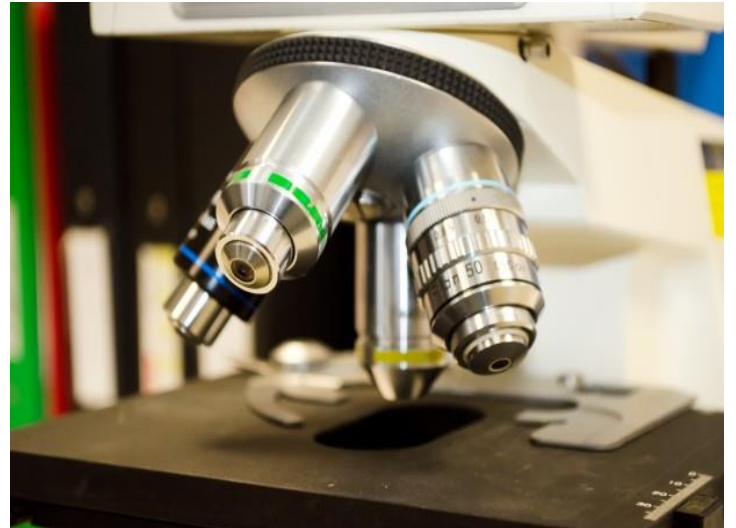
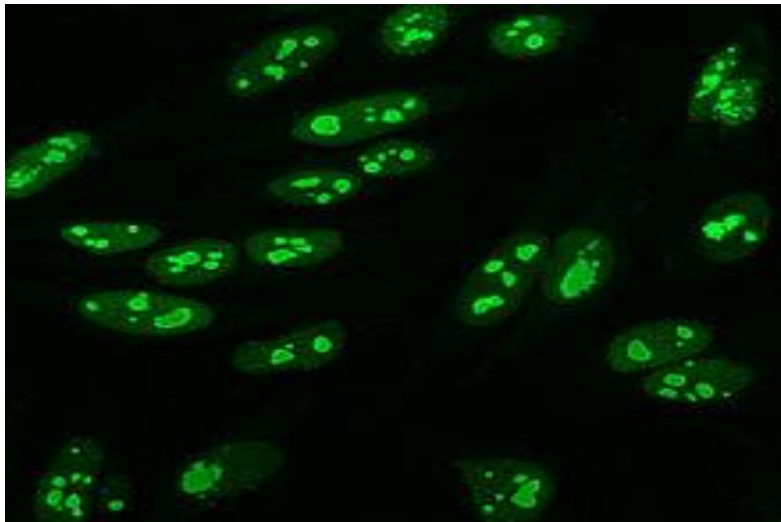
Immunoglobulin



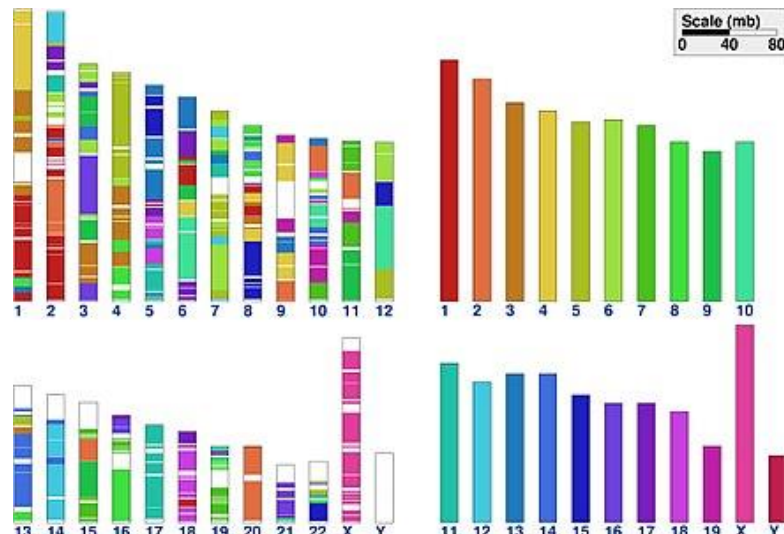
Immunohistochemistry



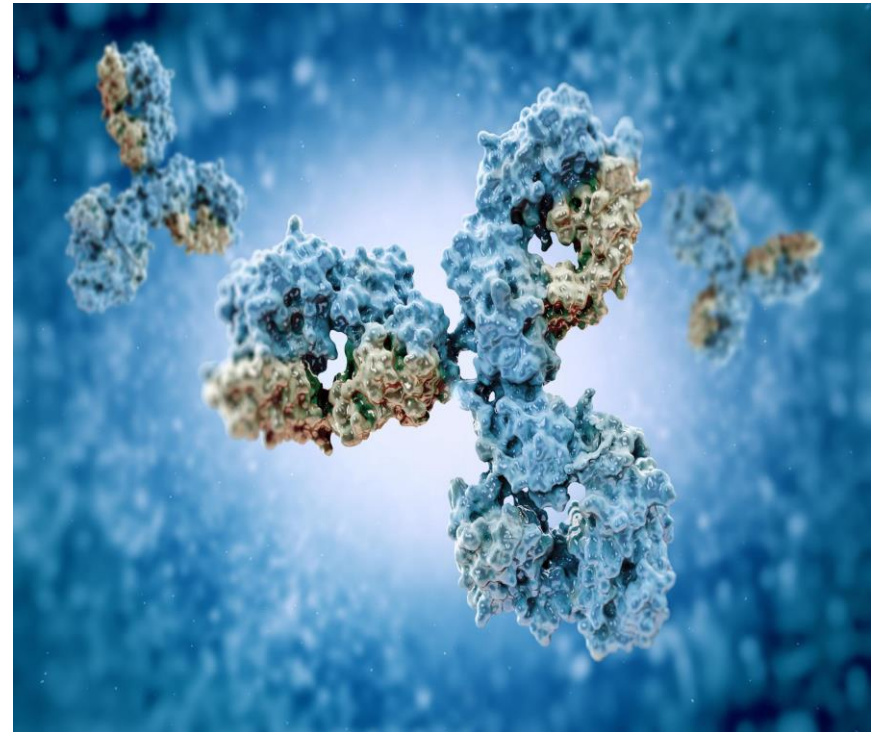
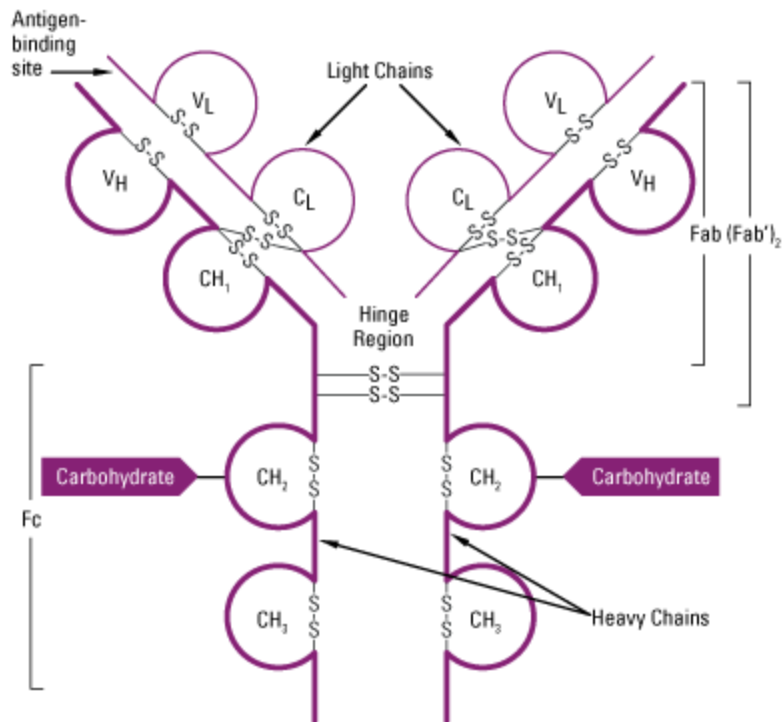
Antibody
Labeled with Fluorescent Tag



Cross reactivity of anti-human Ig with other species not addressed/mentioned



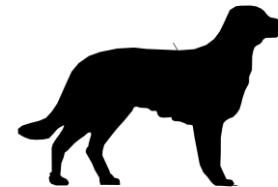
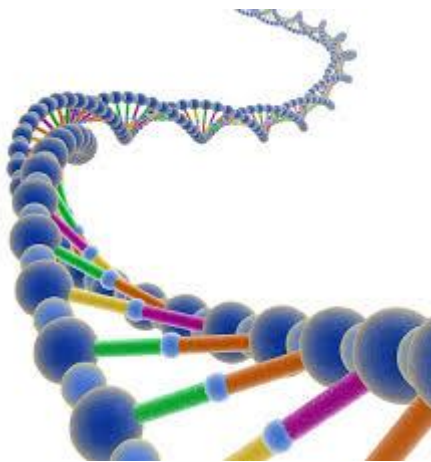
Cross-reactivity with Ig of other species even more of a concern than with albumin

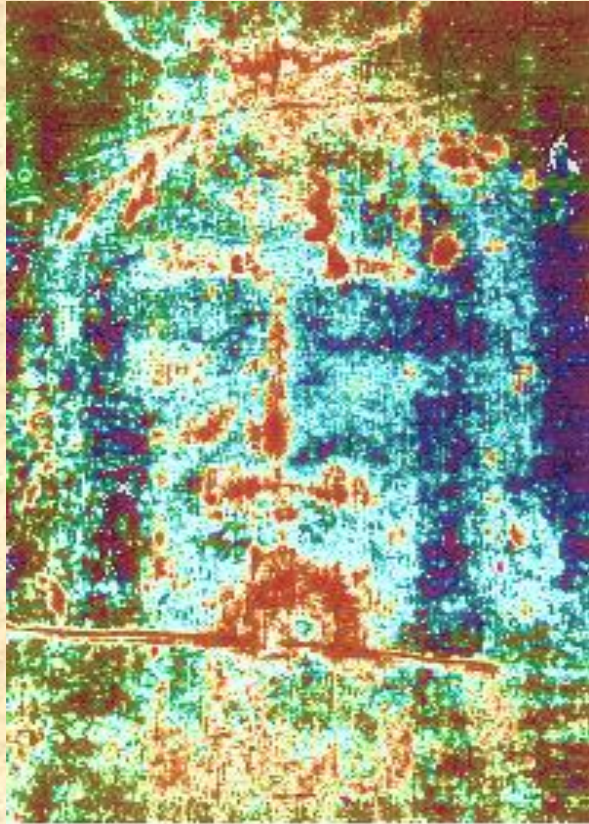


Cross-reactivity of Ig

Human blood +++

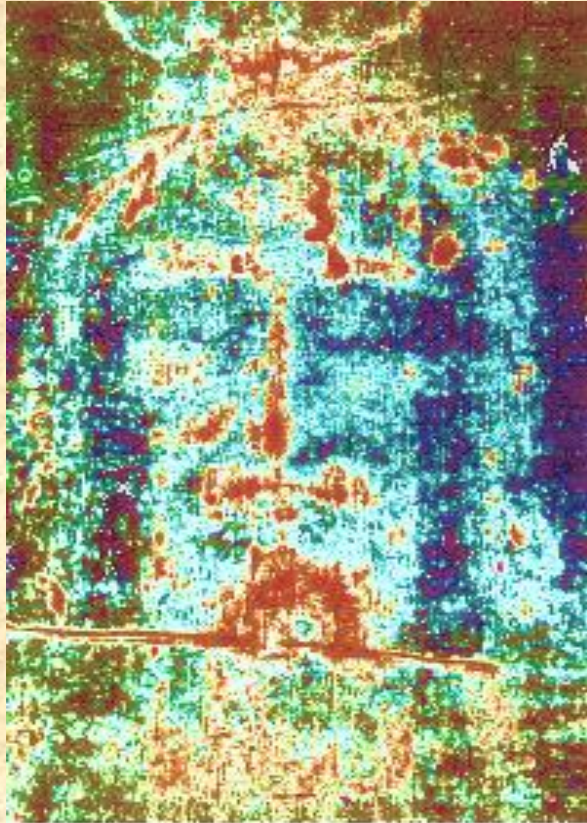
Animal blood +++





What type of blood is it?

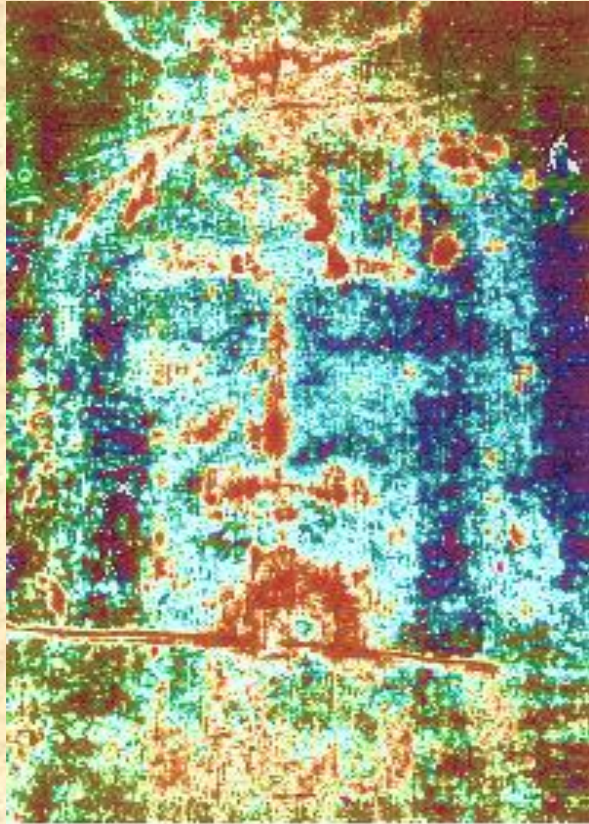
In 2019, the conclusion that it has been demonstrated that human blood exists on the Shroud can no longer be justified



What type of blood is it?

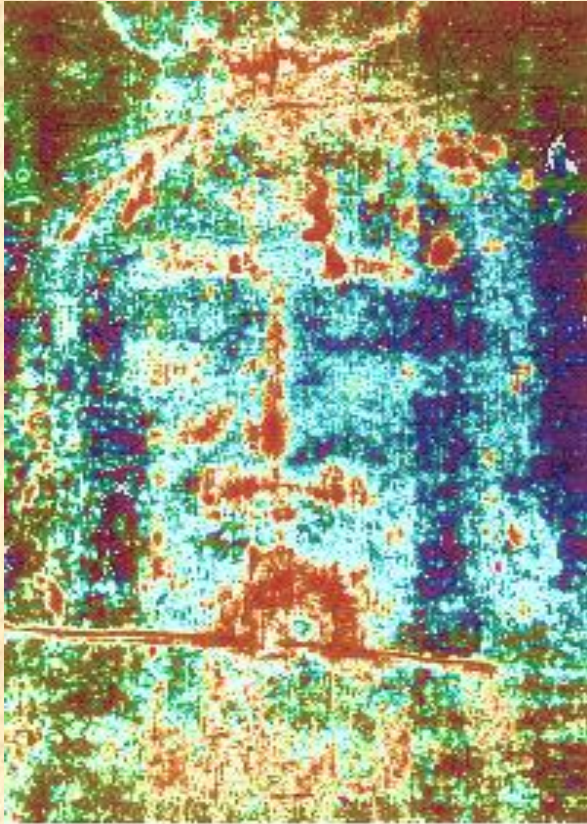
Anatomical accuracy arguments have their merit but can only go so far

Direct scientific testing is required for a definitive answer



No experiments have
ever been done to
evaluate if animal blood
might be present on the
Shroud

Not part of any
experimental design



Human blood
Directly verify

Animal blood
Directly rule out



Blood Species Summary

New evidence shows that cross-reactivity is much greater than previously considered

These findings are corroborated by advances in genetic and protein sequencing of molecules among species

The conclusion that the blood on the Shroud has been demonstrated to be of human origin should be reconsidered