Crafty Parasites – Malaria

Teacher Guide

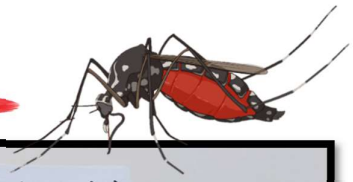
Welcome to The Australian Society for Parasitology's *Crafty Parasites* series, a STEAM video resource that aims to make **pesky parasites lovable** through art and science. In the first episode, *Malaria*, award-winning scientist, artist, and STEAM advocate, Dr Rina Fu is with two young scientists as they learn about the parasites, the real-world research, and the global impact of this deadly disease. There's even an original song that featured on ABC Catalyst. This 15 minute digital production introduces medical science to young viewers through hands-on art-and-craft, stimulating both their **curiosity** and their **creativity**. The video contains step-by-step **peer-led** instructions and uses multiple cameras angles to make it easy to follow, whether it's making a pipecleaner **mosquito** or one of the seven stages of the **malaria parasite**. The **craft** includes **embedded mathematics** such as requiring students to take measurements and have an understanding of fractions. The episode also incorporates **authentic research** footage, including those captured by **state-of-the-art** fluorescence technology and **award-winning** Nikon microscopy. **Printable resources** of red blood cells, blood vessels, and scientific vocabulary add an extra interactive avenue for students to create their own story to demonstrate their understanding. For example, the episode includes a fun stop-motion animation of the malaria life cycle using these provided materials to demonstrate what students might produce themselves. The *Crafty Parasites* series is designed with **accessibility** in mind with full English **captioning** and **AUSLAN** interpretation.

#STEM #STEAM #DISEASE #GIRLSINSCIENCE #PARASITES #MICROSCOPY #CRAFT #MALARIA

- ✓ **Craft Instructions –(Mosquito)**
- ✓ **Craft Instructions –(Malaria parasite**) – Sporozoite, Ring, Trophozoite, Schizont, Gametocytes
- ✓ **Print-Out:** Props & Interactive Elements (red blood cells, blood vessels, liver, parasite life cycle)
- ✓ **Curriculum Links**
- ✓ **Puzzles x 3: Word Search** & **Crossword** & **Maze** (Malaria & Craft themed) with answer key
- ✓ **Colour-in Activity** (Microscopy themed)

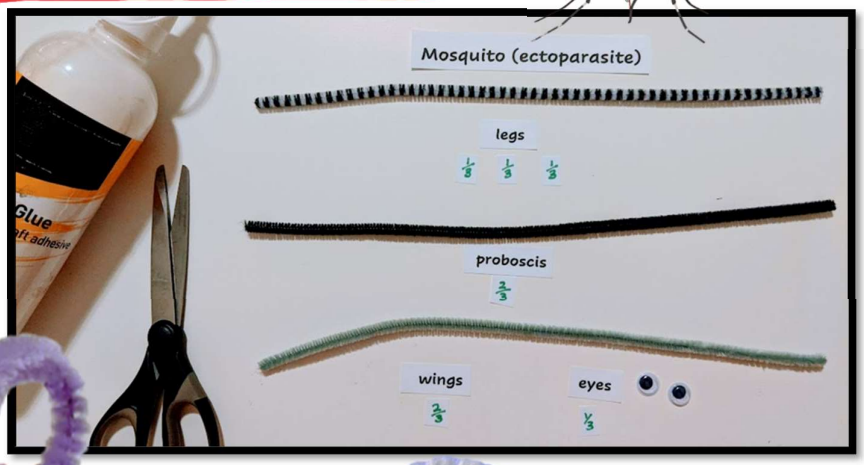
Crafty Parasites – Malaria

Craft Instructions - Mosquito



Materials:

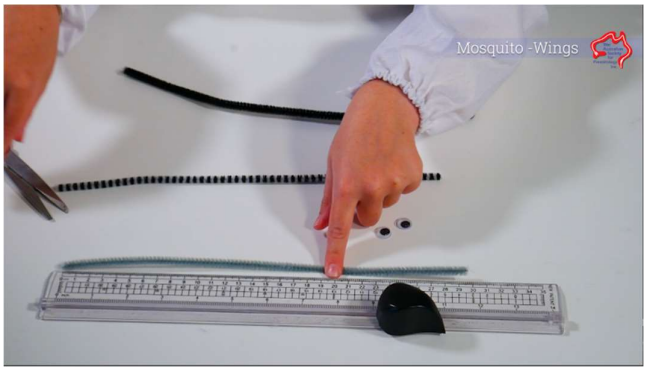
- Craft Glue
- Scissors
- 3 x pipecleaners (Dark mozzie: black, grey, stripey) (Light mozzie: purple, pink, stripey).
- 2 x googly eyes



Step by Step - Mosquito

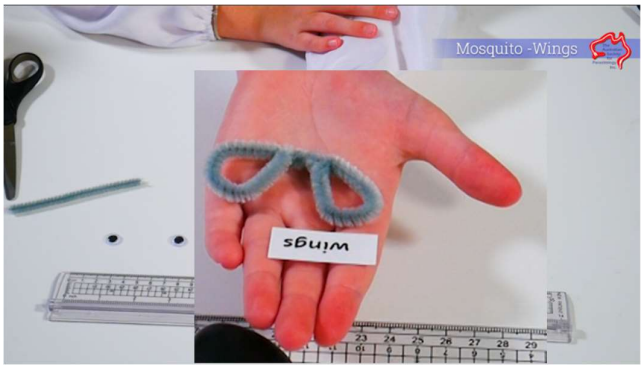
1. Mosquito - Wings:

Cut the pipecleaner into two-third length. A pipecleaner is about 30 cm, so if we divide it into 3, we have 10cm each. Two-third length equals to 20cm.



Keep the little piece for the eyes.

2. Bend the ends towards the centre and give it a twist so we end up with 2 loops for the wings.



3. Eyes:

Take the short piece, make a fold in half then roll the ends towards the centre.

We then stick the googly eyes on with some glue.

4. Legs:

Cut the pipecleaner into 3 equal parts.

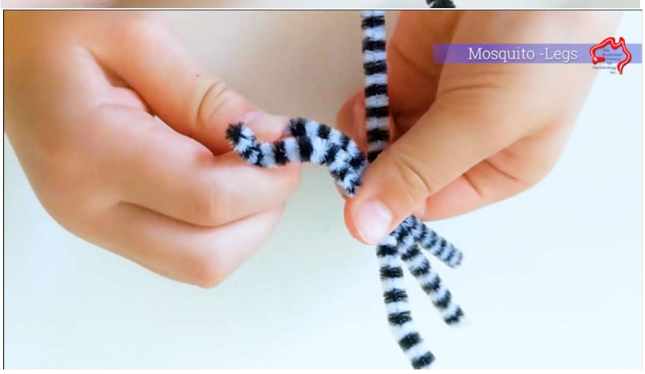
Twist them together at the center, with one large bend (‘knee’) and one smaller bend in each leg (‘foot’).

5. Proboscis:

This is the needle of the mosquito's mouthpart. Cut a dark colour pipecleaner into two-third length.

We poke this through the face, the rest is used as the body where we twist the wings and legs onto it.

Bend the pipecleaner backwards into a tighter fold to hold the legs in place. *If the face falls off, simply thread it back in after you have secured the legs.*

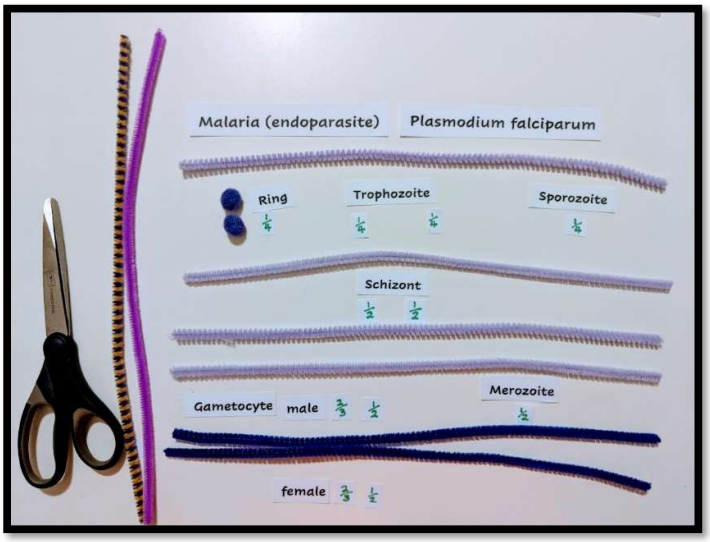


Crafty Parasites - Malaria

Craft Instructions - Malaria *(Plasmodium)*

Materials:

- Craft Glue
- Scissors
- 4 x light purple pipecleaners
- 2 x dark purple pipecleaners
- 2 x tiny dark purple pom poms
- Extra colours (dark purple, pink, yellow or brown) for cutting into tiny pieces



Step by Step - Malaria *(Plasmodium)* stages

Preparation: Cut one light purple pipecleaner into 4 equal length pieces.

1. Sporozoite:

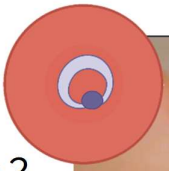
Take one ¼ length **light purple** piece, cut it in half so we can make 2 sporozoites. Bend each piece into a 's' shape.

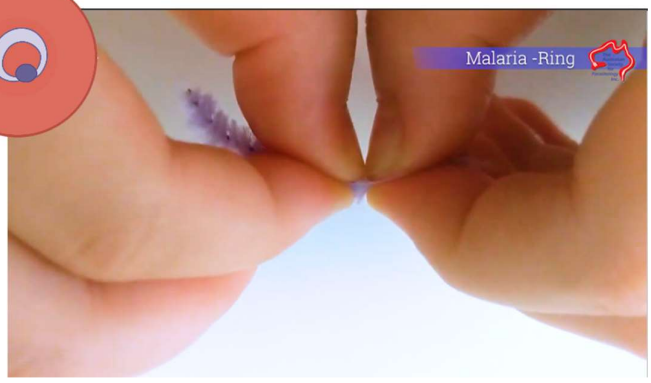
Cut a short dark purple piece, wrap it around the center of the light purple piece.

Keep the other ¼ pieces for the ring. and trophozoite stages.

Your malaria Sporozoite is complete!

2. Ring:





Take a ¼ length **light purple pipecleaner**, cut in the middle into 2 pieces.

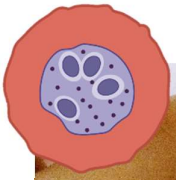
Using your nails, work along the wire to make little bends into a ring.

Place the **tiny dark purple pom pom** between the ends.

Repeat to make a second malaria ring.

Your malaria Ring stage is complete!

3. Trophozoite:



Take a ¼ length **light purple pipecleaner**, using your nails, work along the wire to make little bends into a full circle.

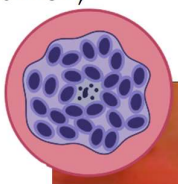
Cut 3 tiny pieces (**pink, yellow, dark purple**), insert into the circle.

Wrap another piece of ¼ length **light purple** around the outside.

Your malaria Trophozoite is complete!

4. Schizont:

Take a ½ length **light purple pipecleaner**, make it into a tight coil.



Cut 8 tiny pieces of **dark purple**, carefully fit each piece in between the coil. These represent the baby merozoites. Most of these will fit, but you can also use a little bit of glue to stick the last few on.

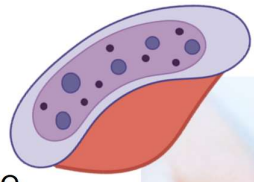
Cut a tiny piece of **yellow** and fit it into the coil. This represents the malaria pigment from digested haemoglobin.

Using your nails, work along the wire to curl another ½ length **light purple** and wrap it around the outside.

Fit the remaining 5 tiny pieces of **dark purple** and **pink** sandwiched in the coil (4 x dark purple, 1 x pink).

Your Schizont is complete!

5. Gametocyte:



Male Gametocyte

Use a 2/3 length **light purple** pipe cleaner. Bend the ends towards the centre, squish together into a sausage shape. Tuck the ends in the centre space.

Cut tiny pieces of 2 x **pink**, 2 x **yellow** and 2 x **dark purple**. Fit the tiny pieces in between the light purple pipe cleaner.

*Take care when handling the little pieces, as they may be sharp.

Using your nails, work along the wire to pre-curl a ½ length **light purple** pipe cleaner. Loosely fit around the previous sausage shape.

Female Gametocyte

Instead of a light purple, use a 2/3 length **darker purple** pipe cleaner.

Your Gametocytes are complete!

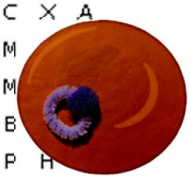
NAME: _____

Crafty Parasites - Malaria

WORD SEARCH PUZZLE

Find the word in the puzzle.
Words can go in any direction.
Words can share letters as they cross over each other.

H U I V R I V W U X N P X Y P U M M F N A B L F Z R K F X E
I B R C P S O M Z M V C Q Q Q G C D E T K I U N I Y S J C I
M U I D O M S A L P V X W C A V T L T P M Y C P O E S T W S
Q T U O P K J J F V G R O Q A F I S Y M D N S B M B O U E I
I G P J L Z B G V Q C B F D W S O C U Q Y V M R P R S M E
C C W P B E E Q C A B N U A T Y U O E O I Z D A M X L C W
I A C H A C Q T X P P H T M D V T T L T C S R G O B D J X
X M W C B D J Q O A G G U R E T H E S W Q A X V S I A G M
T Q B I T H E T I S A R A P O D N E M R P S I G A Q X Q D D
P M R S C I S S O R S W R D C D J A A I I O P X O U A P O T
O F O L P T B L J R W L O Y O Q U S G T S G R X Z I Z Y G K
A B C P N W B W C G P I D K R D R T E O U L T O T T K G G M
N C R A M F H N S I Z A Y H E S M A W O J A R M Z O M G Y D
T O V F E O H P P B W G Y K A T G S Z A E K O U I O X A J W
X U G W K M P E S X H R V U I Z V I P N M S P R X M I E W T
D G L V M H C N B W T Y J S J Y N A I T T I H A V R R T B A
O N K A N L P S X J U R P A F X Z U E N M B O T V J Y T E F
Q I A N E E I I K G X Q L Z E Q G V O I Z T Z V Y G E J J D
P M M A V C T P Y Q O A H J S W X Z G P Z U O L N P C H F G
Q L N H T K D Y V X L A M N E I I F D M T R I S Y I K E W N
N E M F J X M C C W O X X N L H S Q C O U I T W B L O O D I
R Y O K Z D C K S O A N A M C B F T J C E Y E H Q Z Y W D R
F F B R K G C G U W R U H S A W N X N V Q Y G O O D H C X A
S U V Q U M S U N J P H U R E L K G W A B C V N M L R M
N H H F Q J R C Z A M Y T C E Z A C B Q P A J P Z F N M
C F S N Q X P I P F Z W Q Y W B T R R L F O T K X S O B
N F J U N S G U K W Z C J F R E M B I A K D M Z B G G P H
B R B U N W C D U B N Y W N S E G L I A F B H Z P L P W C D
X L Q U N V X Z L I V E R X F L O U Y D T T W M A Y N N S V
W Q O S B W D A P I Y N H Y O X Y I U G Y N H O U R L T



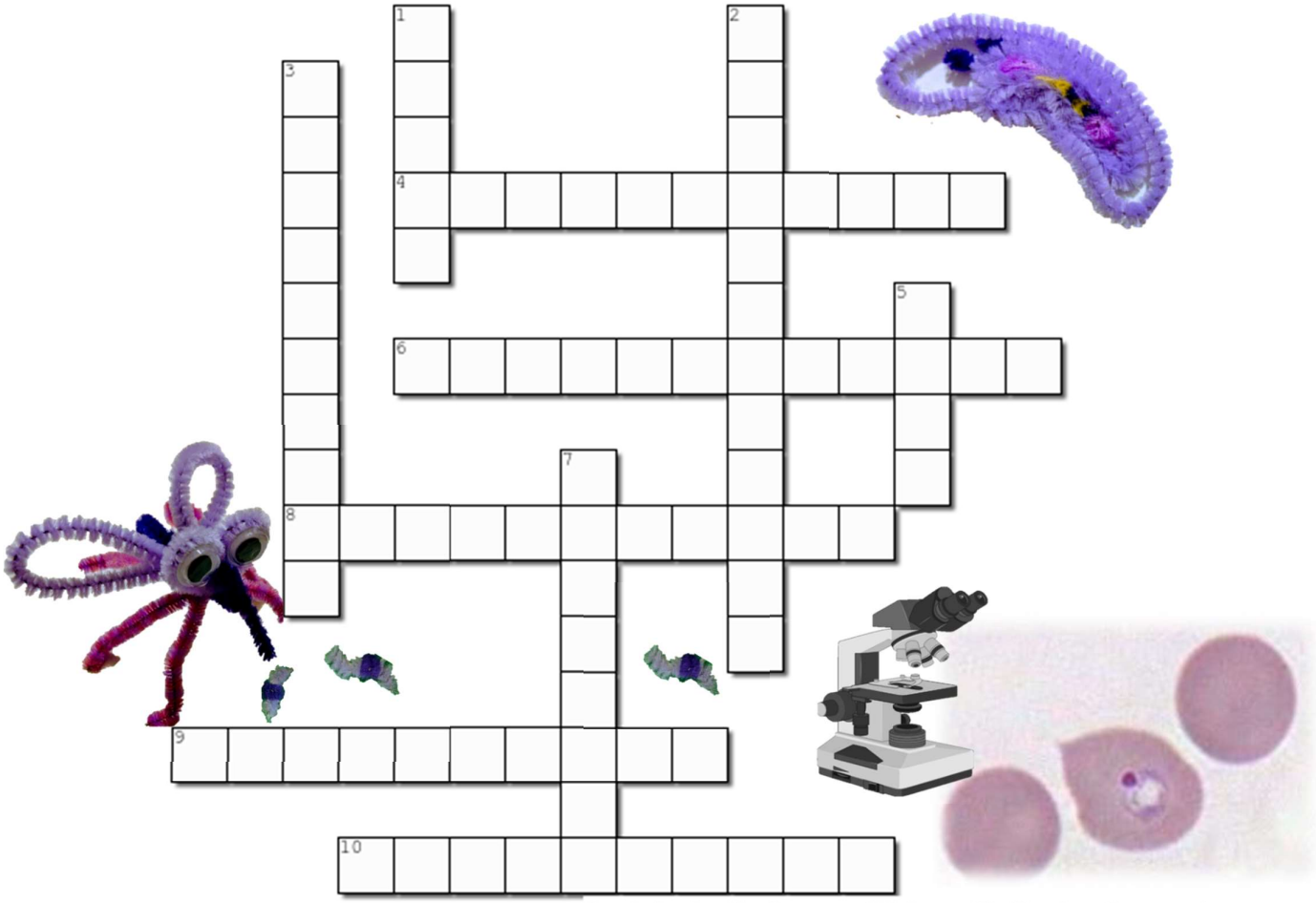
AFRICA
BLOOD
CRAFTY
SOUTHEASTASIA
ECTOPARASITE
ENDOPARASITE
ERYTHROCYTE
GAMETOCYTE
PAPUANEWGUINEA
LIVER
MALARIA
MOSQUITO
PIPECLEANER
PLASMODIUM
POMPOM
RING
SCHIZONT
SCISSORS
SPOROZOITE
TROPHOZOITE

NAME: _____

Crafty Parasites - Malaria

CROSSWORD PUZZLE

Complete the crossword puzzle below.



Across

4. Tiny red cells floating inside you
6. A pest that lives outside of the host's body
8. The malaria parasite stage that grows from the ring stage
9. Scientific name for the malaria parasite
10. It is the malaria parasite stage that comes out of the mosquito saliva when it bites

Down

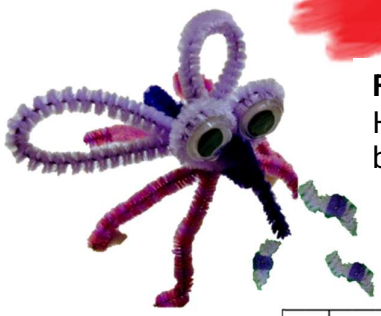
1. A large organ inside you, where sporozoites first invade
2. A parasite that lives inside the host
3. It is a banana shaped parasite stage can be female or male
5. Malaria stage that looks like something you can wear
7. A flying insect that sucks your blood without you noticing

NAME: _____

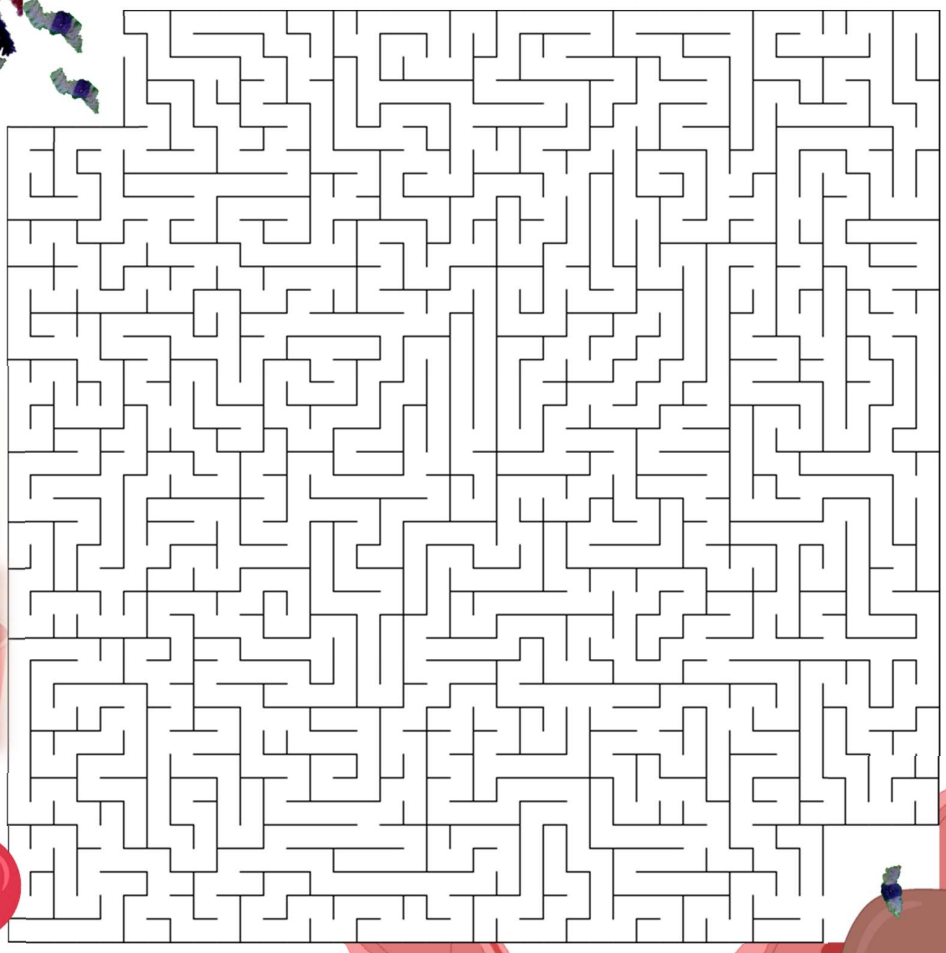
Crafty Parasites - Malaria

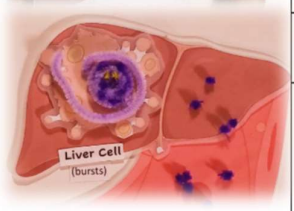
SPOROPZOITE INVASION!

PARASITE MAZE



Find your way through the Maze!
Help the little malaria Sporozoites make their way from the mosquito bite through the skin, through the blood vessels to invade the liver.



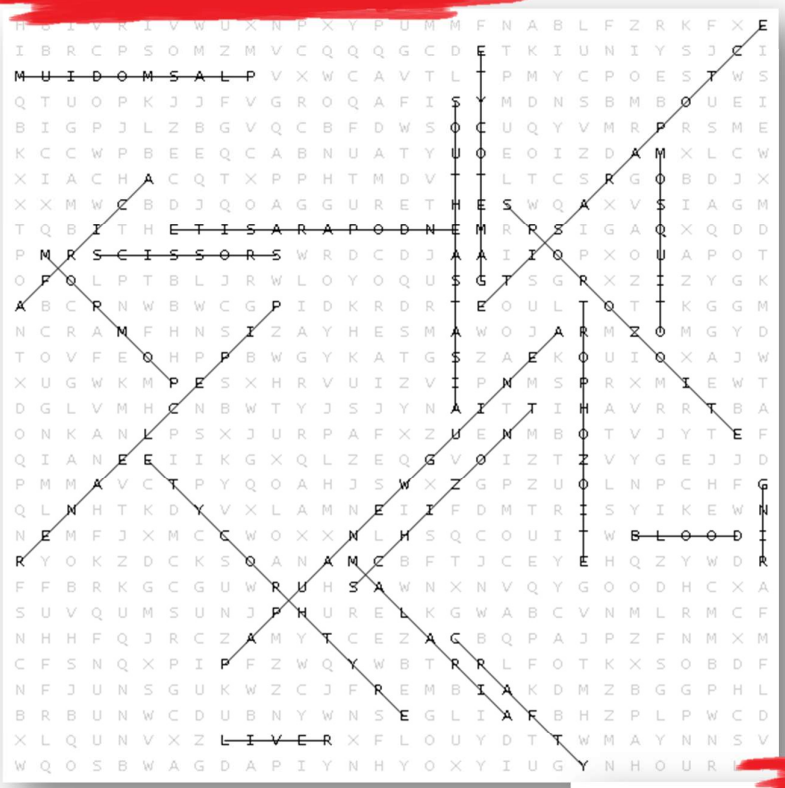


Once the parasites reach the liver, they live inside liver cells (hepatocytes). Each **sporozoite** produces thousands of baby **merozoites**! The merozoites then burst out to invade red blood cells (erythrocytes).

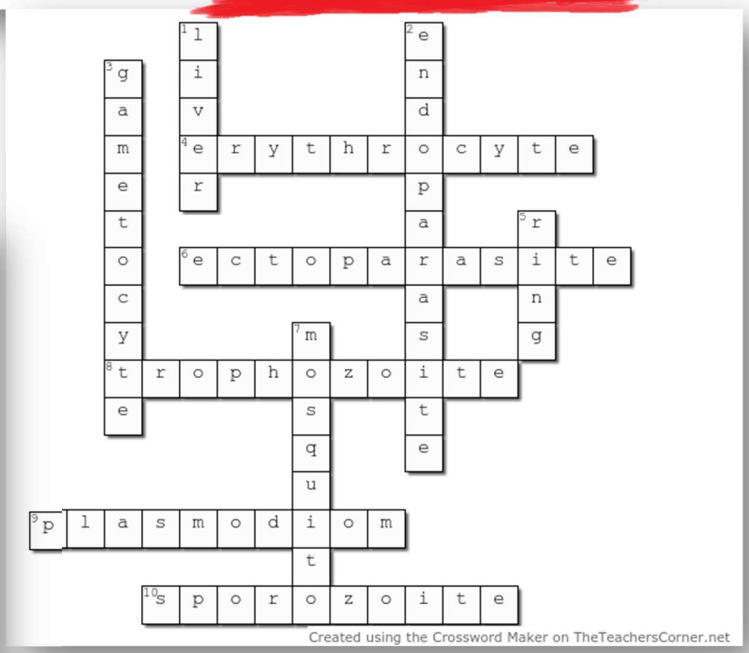
Crafty Parasites - Malaria

ANSWER KEY

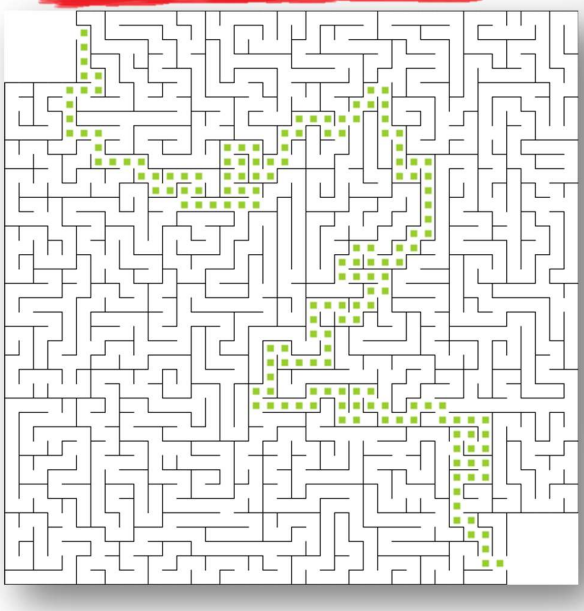
WORD SEARCH



CROSSWORD



PARASITE MAZE



NAME: _____

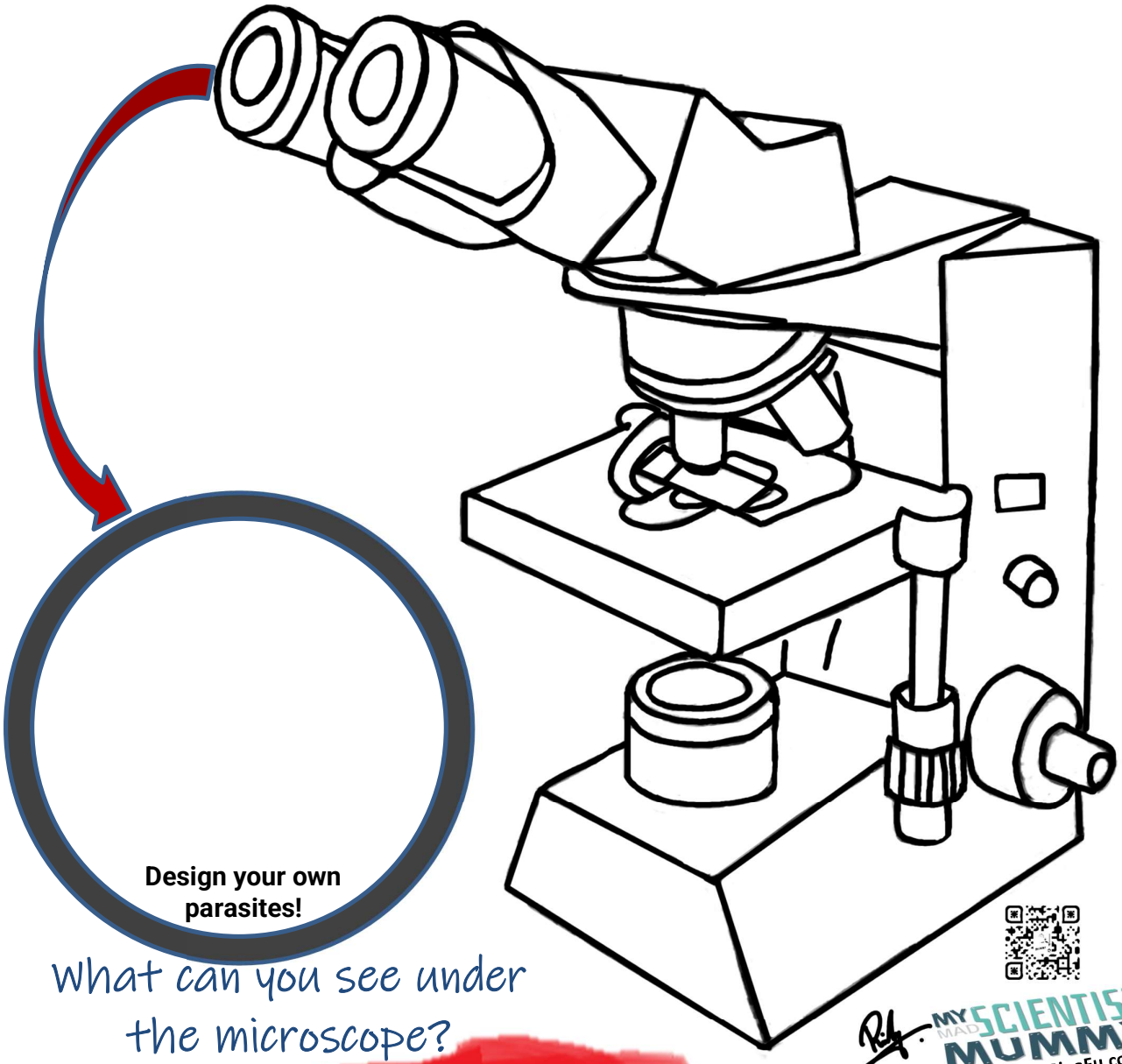
Crafty Parasites - Malaria

COLOUR-IN

Colour in your microscope!
A light microscope magnifies microbes up to 1000 xs their actual size!

Microscope

Magnifies tiny microbes.



Design your own parasites!

What can you see under the microscope?

You know how big 1mm is? 1mm = 1000 micrometer (um).
A red blood cell (**erythrocyte**) is about 8um in diameter.
A malaria parasite (***Plasmodium***) - ring form is about 4um. A typical bacteria is about 1 to 3um.

Extended Activity:

The Fight Against Malaria

Music Video – Research In Song

Sing-along in karaoke style - Visit:
RinaFu.com > Songs > Fight Against Malara

The Fight Against Malaria – is an original composition by Dr Rina Fu. It was voted People's Choice and a finalist in FameLab and the inaugural 3-Minute Thesis Competition where PhD candidates presented their doctoral research in 3 minutes. The song was also included in the ABC Catalyst – Sell Your Science. The video showcases Rina's research from the jungles of Papua New Guinea to the infectious laboratory in Perth, Australia to developing cutting edge DNA technology to screen for malaria drug resistance at Case Western Reserve University, Ohio USA. *Rina had the honour to perform this at Convention Centres in Adelaide, Brisbane and Melbourne, including the 1st World Malaria Congress.*

Runtime: 1 min 36 sec

Curriculum Aligned Links

We have **aligned the Crafty Parasites-Malaria** workshop to the **Early Years Learning Framework (EYLF)** for **young children** as well as the **Australian Science Curriculum** (Science Understanding, Science as a Human Endeavour, Science Inquiry Skills) for **primary and high school students**.

Access Link for Teachers:

https://www.parasite.org.au/outreach/craftyparasites/

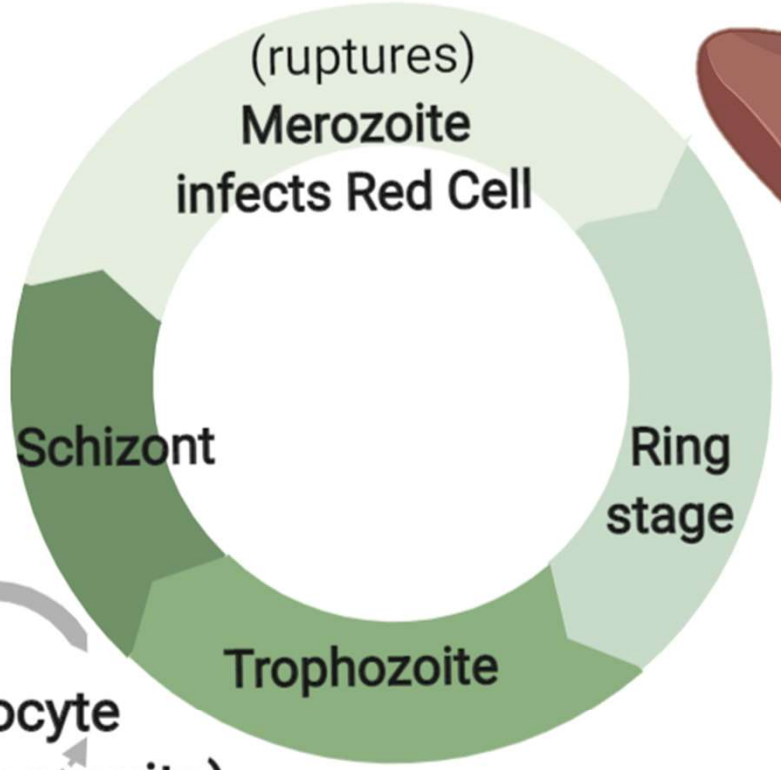
- Australian Science Curriculum
- Science Teaching Links by States
- Link to EYLF Birth to 5 years
- Foundation Year/Preprimary
- Year 1 to Year 10

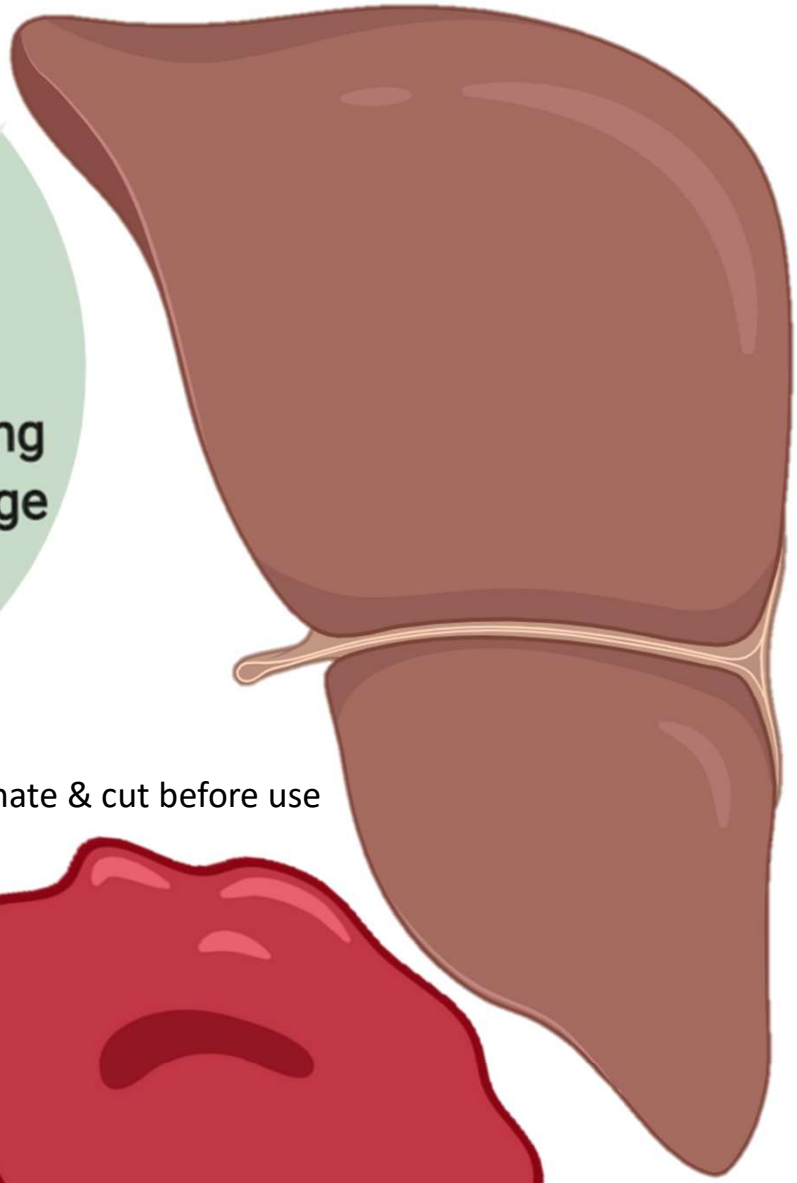
Crafty Parasites
Malaria Craft Printouts

Designed by Dr Rina Fu

The Australian Society for Parasitology Inc.

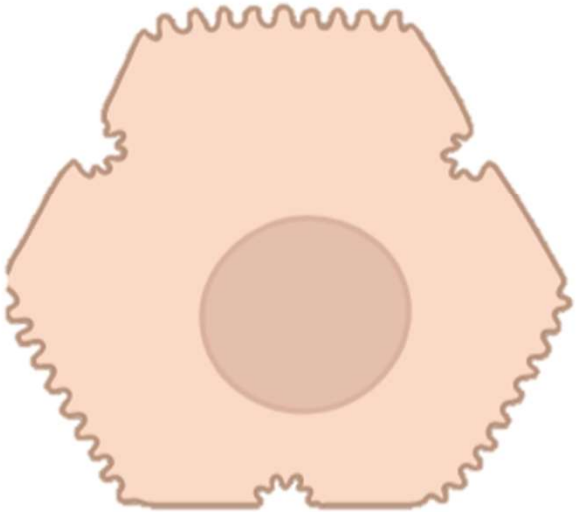
MicroToons & Biorender

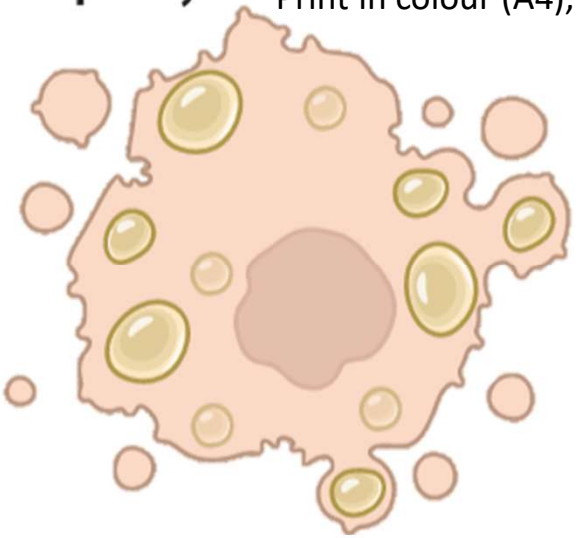




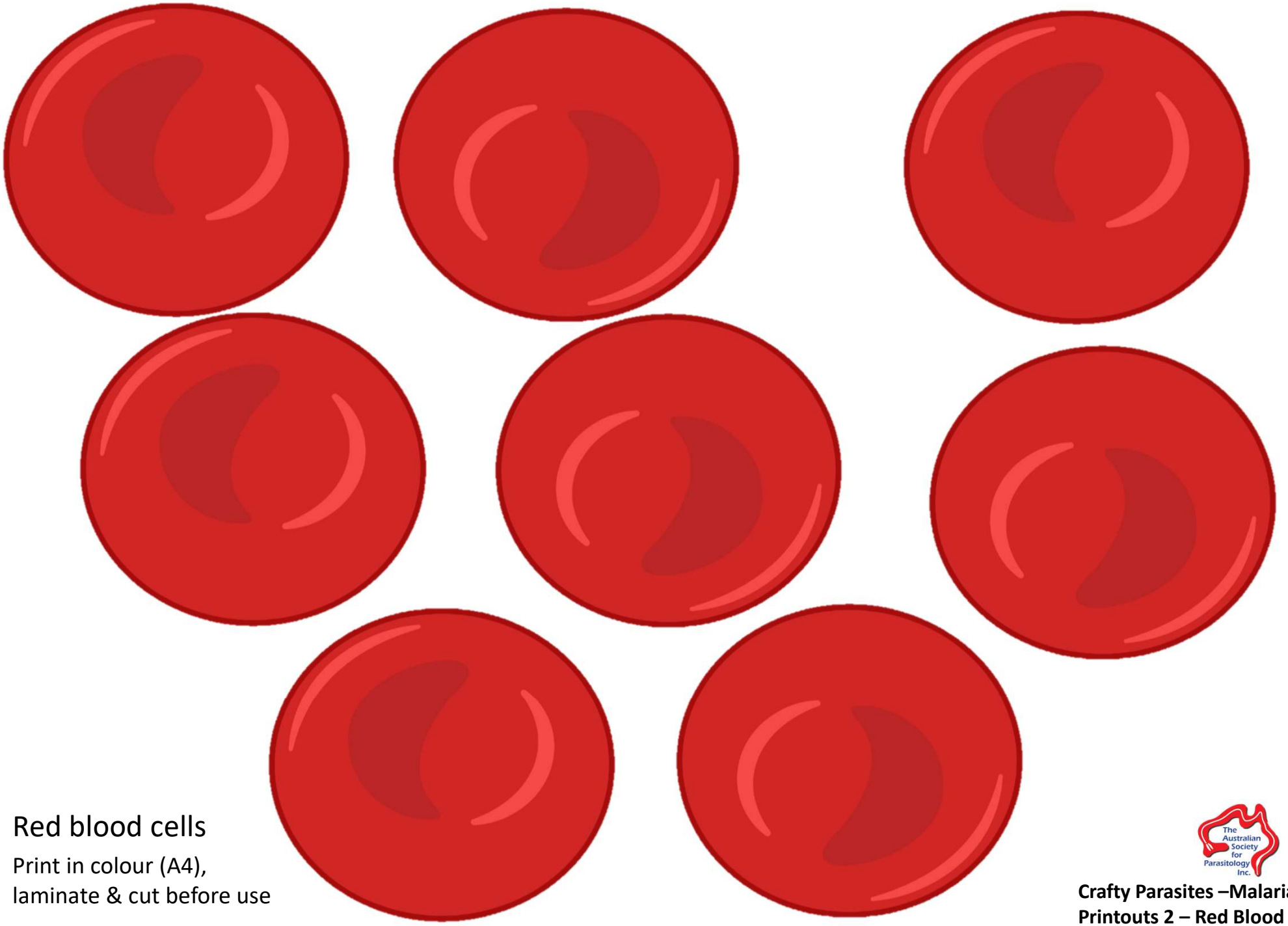
Gametocyte
(infects a mosquito)

Print in colour (A4), laminate & cut before use





Liver Cell (bursts)



Red blood cells

Print in colour (A4),
laminate & cut before use

Merozoite Ring Trophozoite Schizont Gametocyte Liver

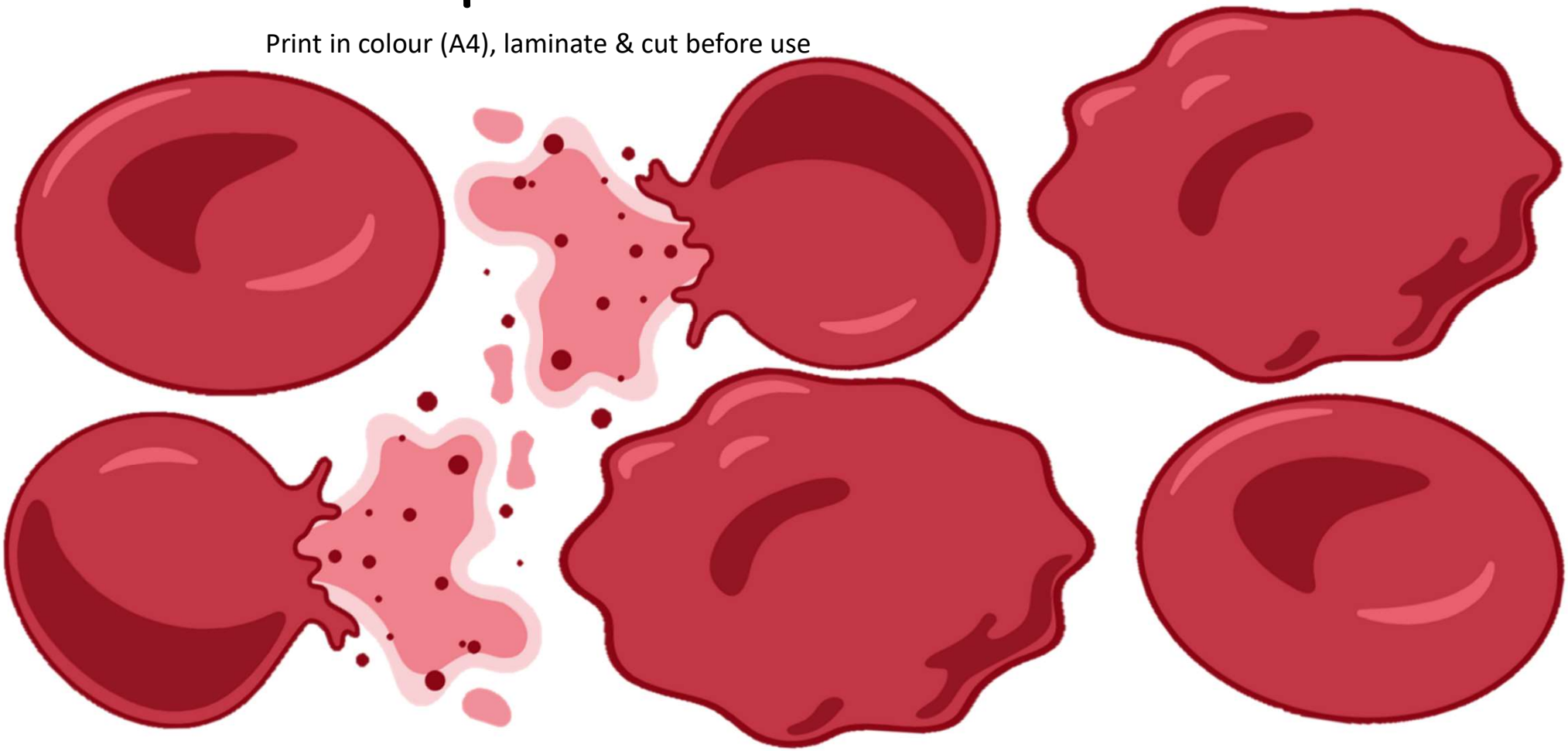
female male Sporozoite legs wings proboscis eyes

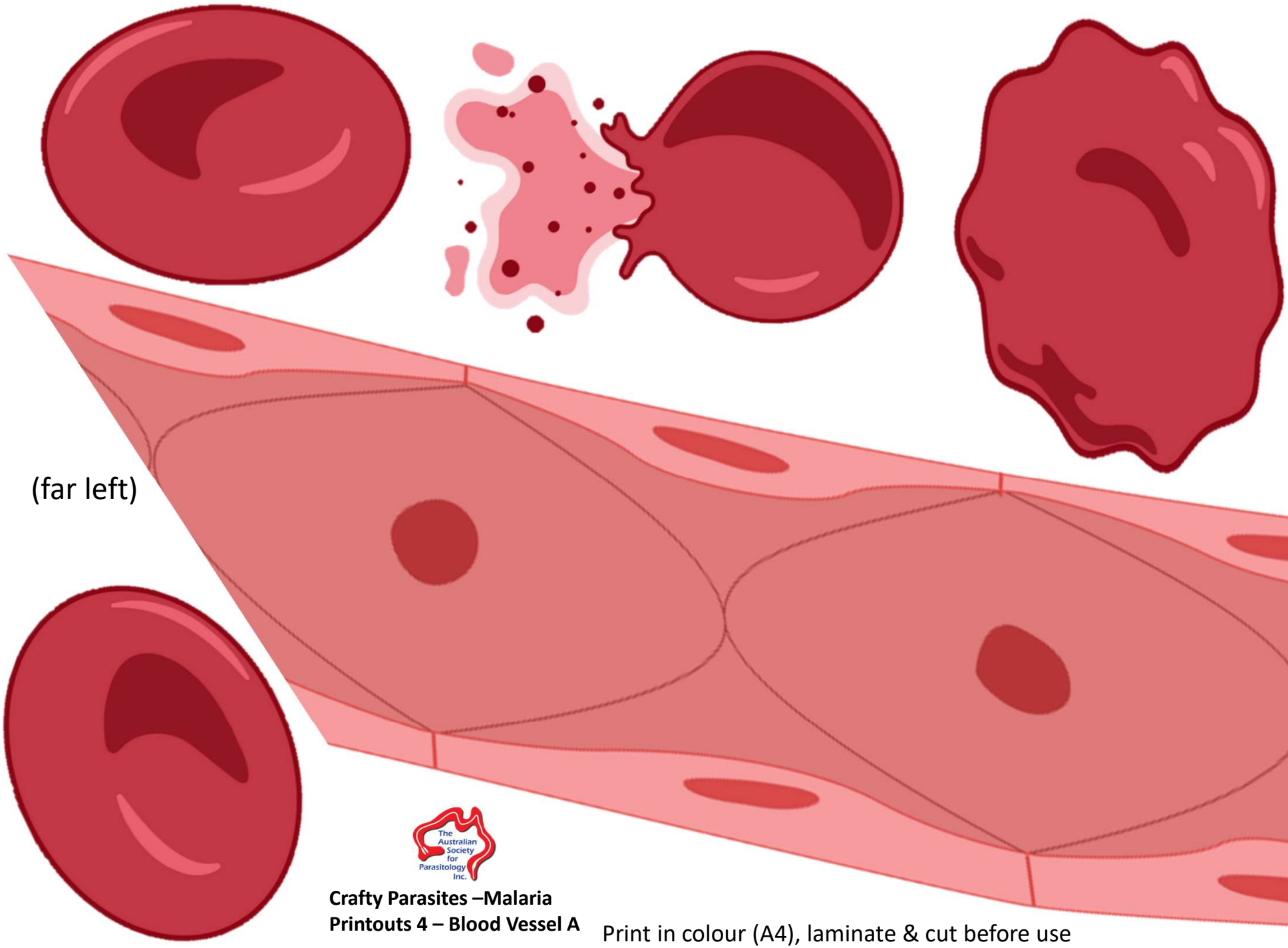
Mosquito (ectoparasite) Malaria (endoparasite)

Plasmodium falciparum RED CELL CYCLE

Crafty Parasites –Malaria
Printouts 3 – Labels & RBC

Print in colour (A4), laminate & cut before use





(far left)

Connect with A

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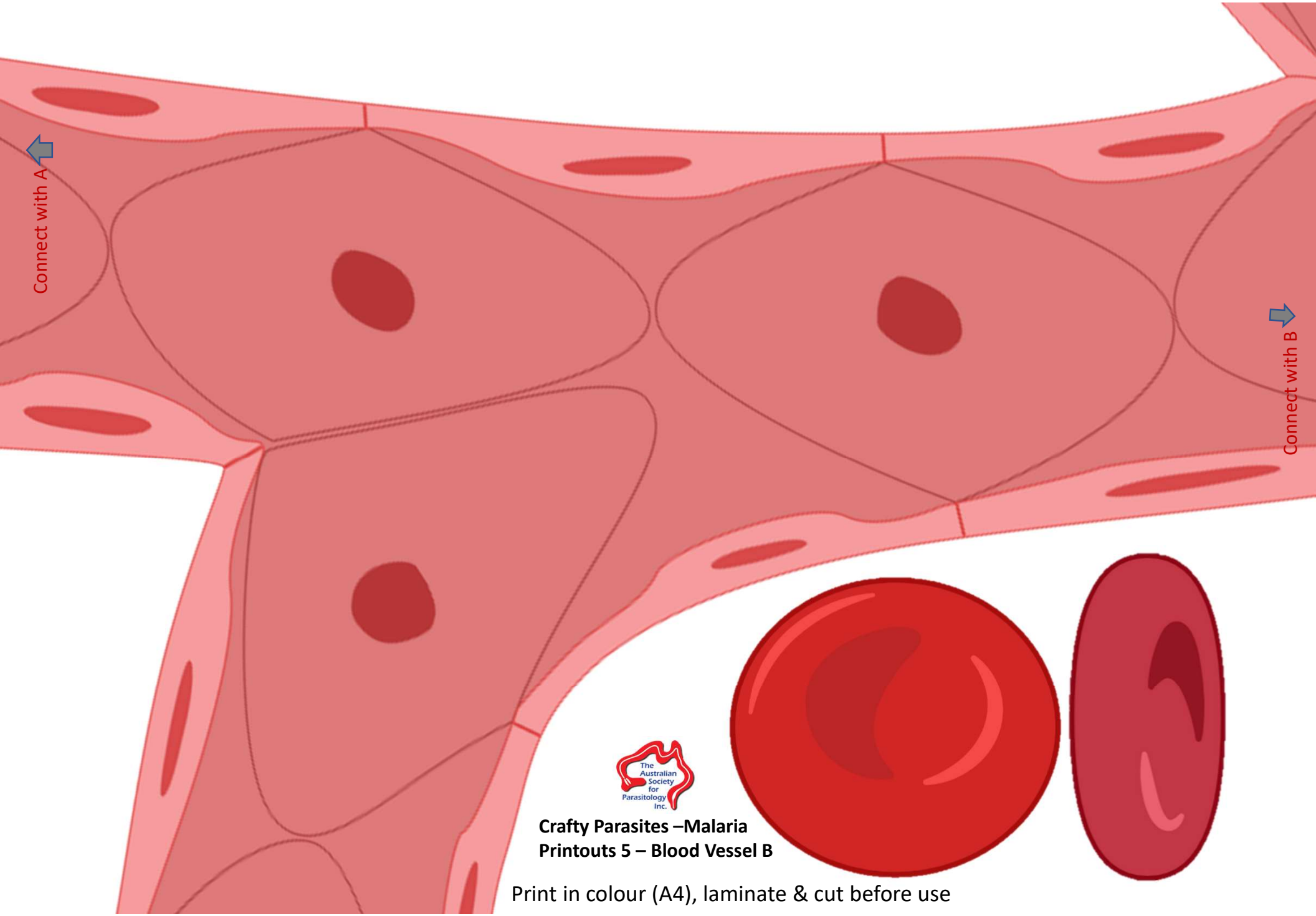
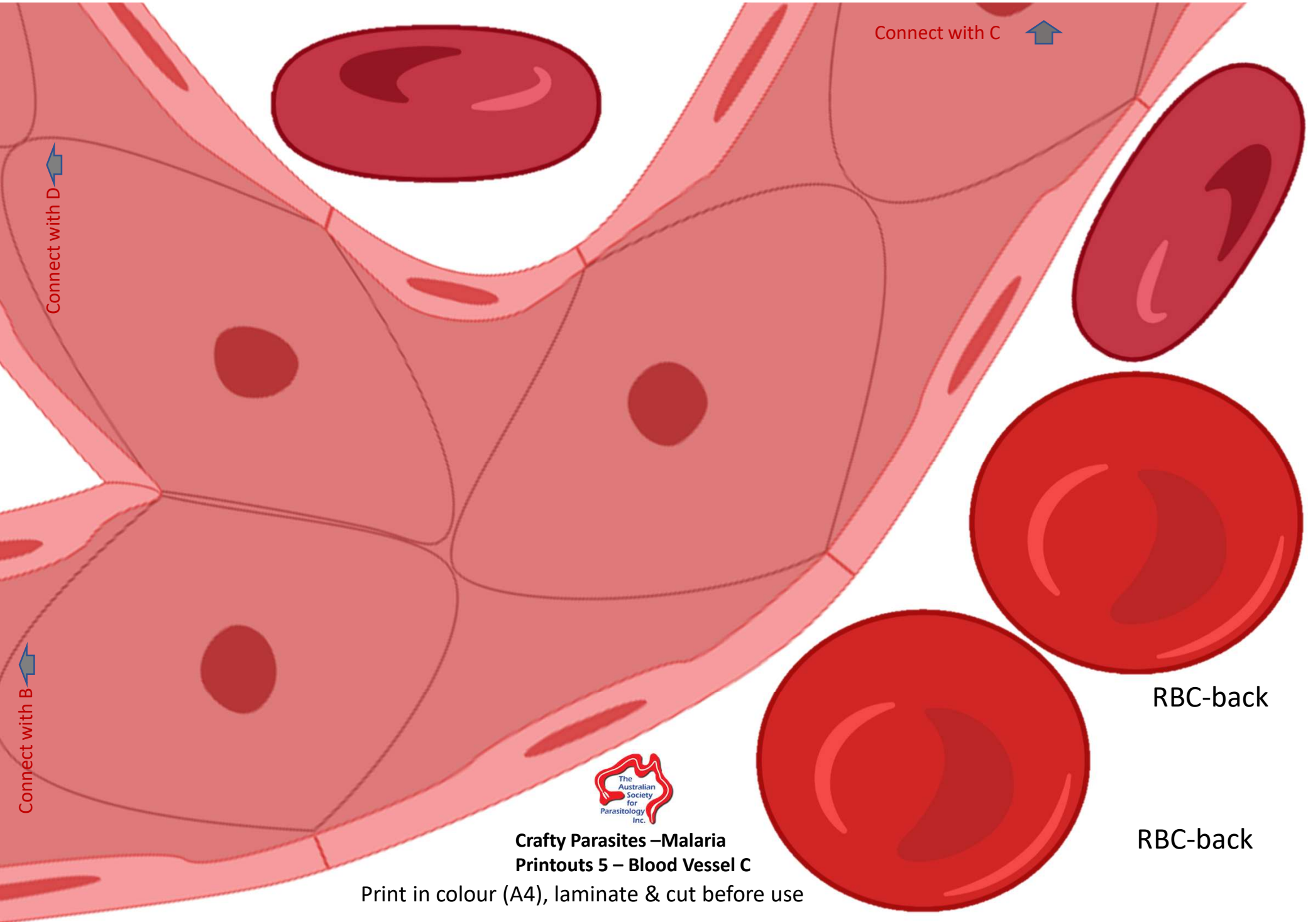
Crafty Parasites –Malaria
Printouts 4 – Blood Vessel A

Print in colour (A4), laminate & cut before use



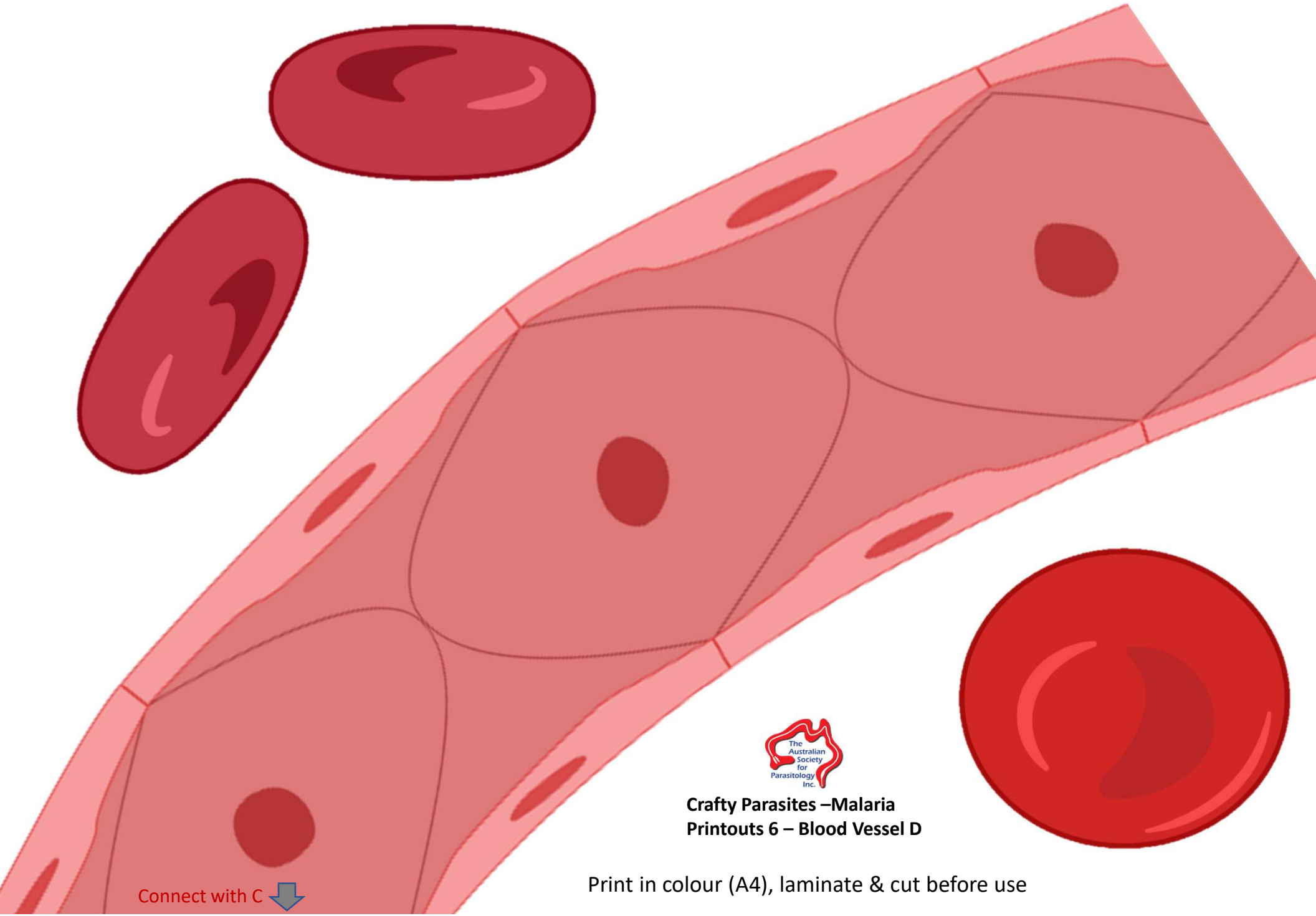
Crafty Parasites –Malaria
Printouts 5 – Blood Vessel B

Print in colour (A4), laminate & cut before use



Crafty Parasites –Malaria
Printouts 5 – Blood Vessel C

Print in colour (A4), laminate & cut before use



Crafty Parasites –Malaria
Printouts 6 – Blood Vessel D

Print in colour (A4), laminate & cut before use

Connect with C

Print in colour (A4), laminate & cut before use

Crafty Parasites –Malaria

Printouts 7 – Blood Vessel E

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Blood Vessel - Top

Connect with D