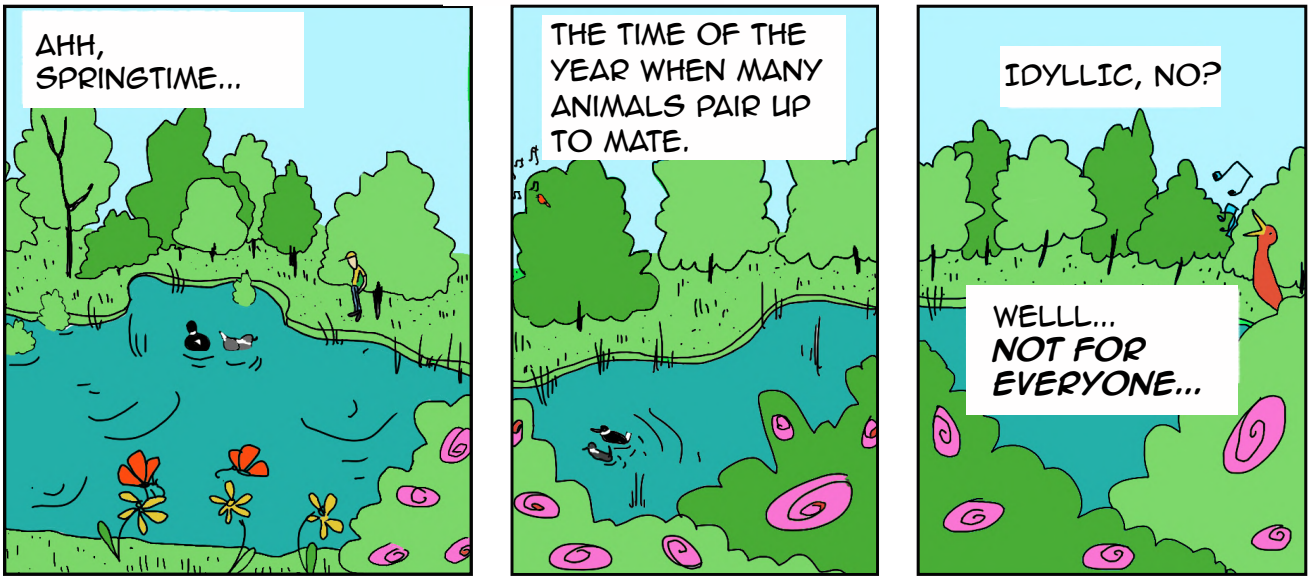
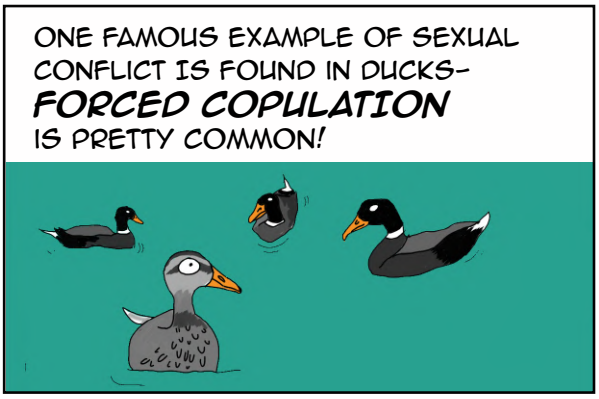
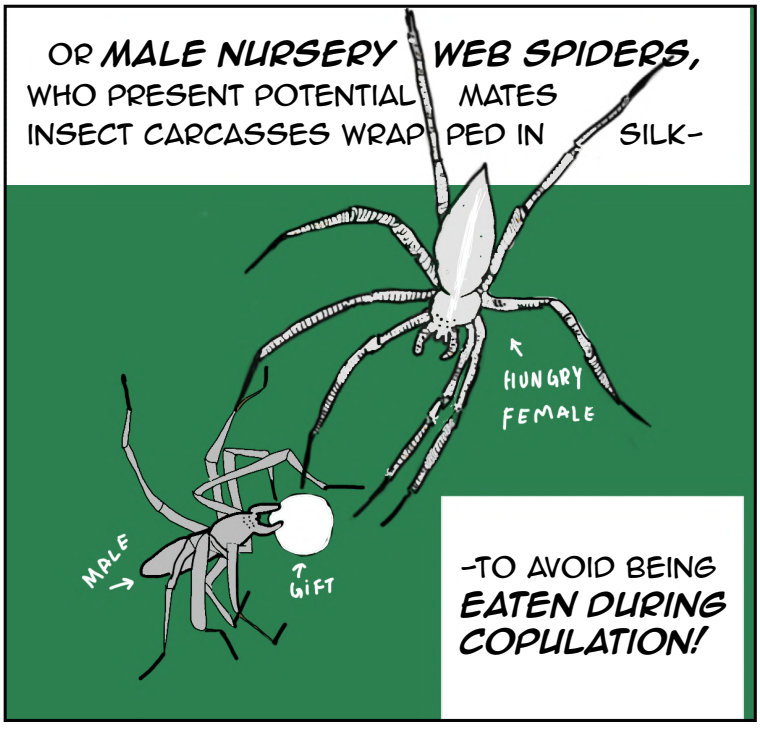
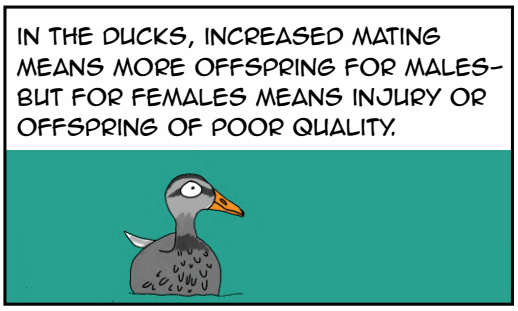
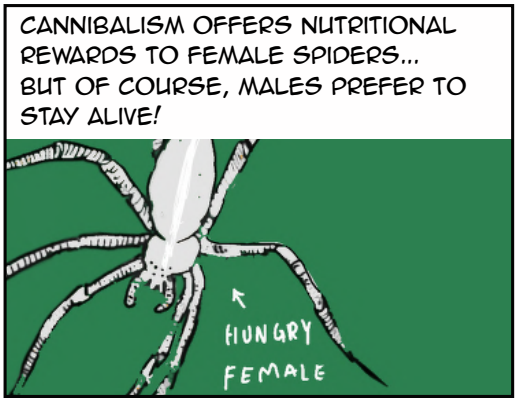
THE PECULIARITIES OF PORPOISE SEX





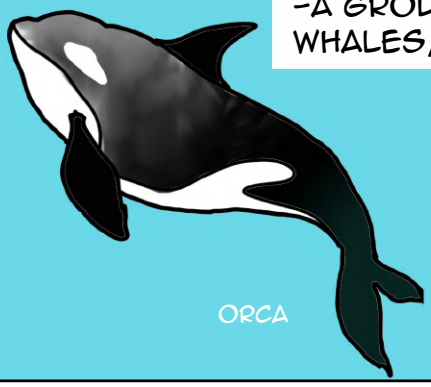


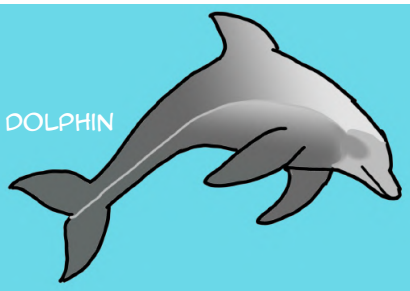




ONE LESSER-KNOWN EXAMPLE OF SEXUAL CONFLICT CAN BE FOUND IN SOME ***CETACEANS-***

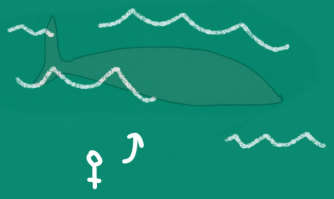
-A GROUP OF MARINE MAMMALS INCLUDING WHALES, DOLPHINS AND PORPOISES.



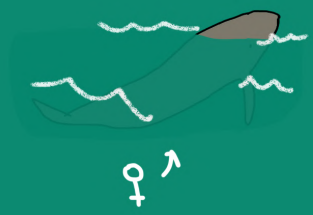


LET'S TAKE A LOOK AT THE VERY ODD MATING BEHAVIOR OF ***THE HARBOR PORPOISE:***

A FEMALE PORPOISE IS SWIMMING...



...SHE'S SURFACING TO TAKE A BREATH...



...SHE HAS NO IDEA WHAT'S ABOUT TO HAPPEN-

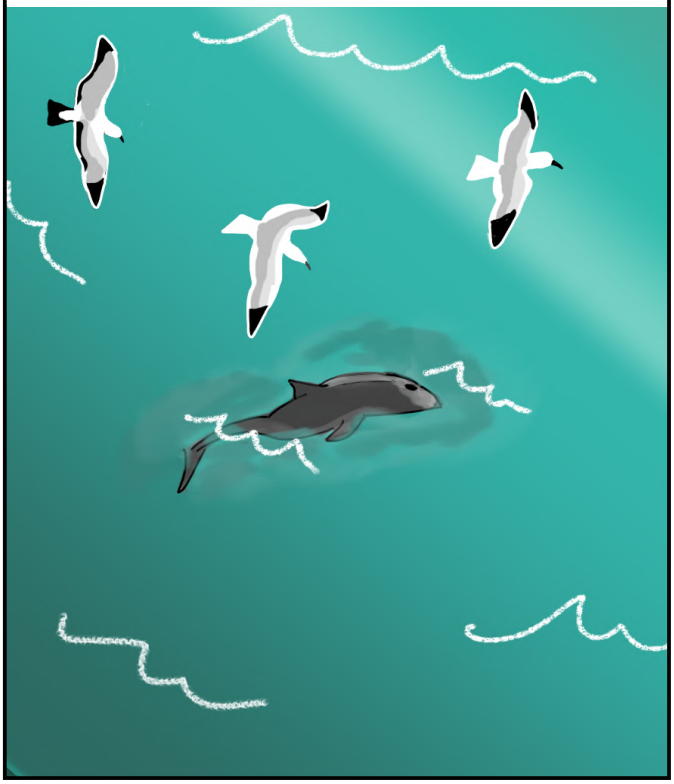
THIS ALL TAKES PLACE WITHIN TWO SECONDS.

-WHEN A MALE PORPOISE, WHO HAS BEEN LURKING NEARBY, ***LEAPS FROM THE WATER*** -PENIS ERECT- TRYING TO ***FORCIBLY MATE*** WITH THE FEMALE!

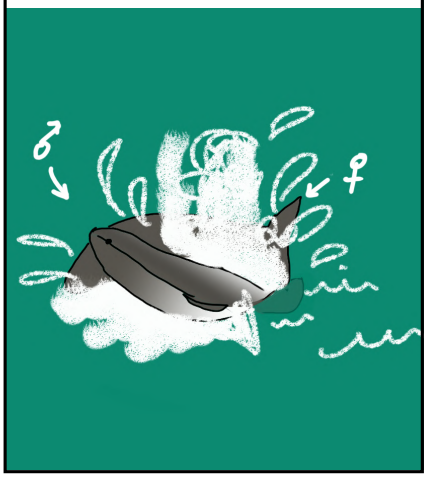
A GROUP OF RESEARCHERS HAD OBSERVED THIS COERCIVE BEHAVIOR FROM THE GOLDEN GATE BRIDGE IN THE SAN FRANCISCO BAY.

EVERY DAY DURING EBB TIDES, THE PORPOISES WOULD SWIM UNDER THE BRIDGE AND OUT OF THE BAY...

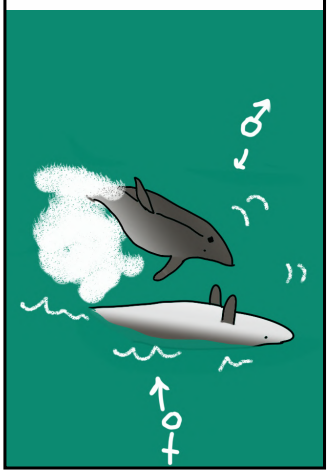
...AND THE BIOLOGISTS TOOK VIDEOS AND PHOTOGRAPHS OPPORTUNISTICALLY, DOCUMENTING EACH INTERACTION.



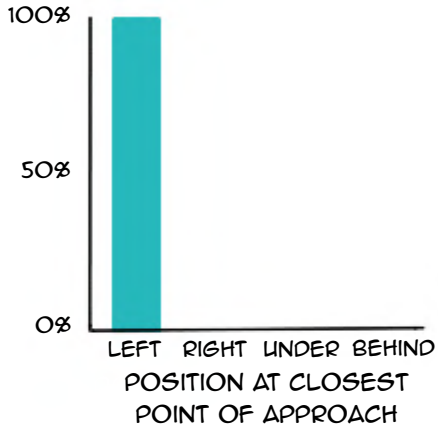
AND IN OVER
144 MATING EVENTS...



RECORDED OVER
8 YEARS...



THEY FOUND THAT MALES ALWAYS–***100% OF THE TIME***– APPROACHED FEMALES FROM ***THE LEFT SIDE!****

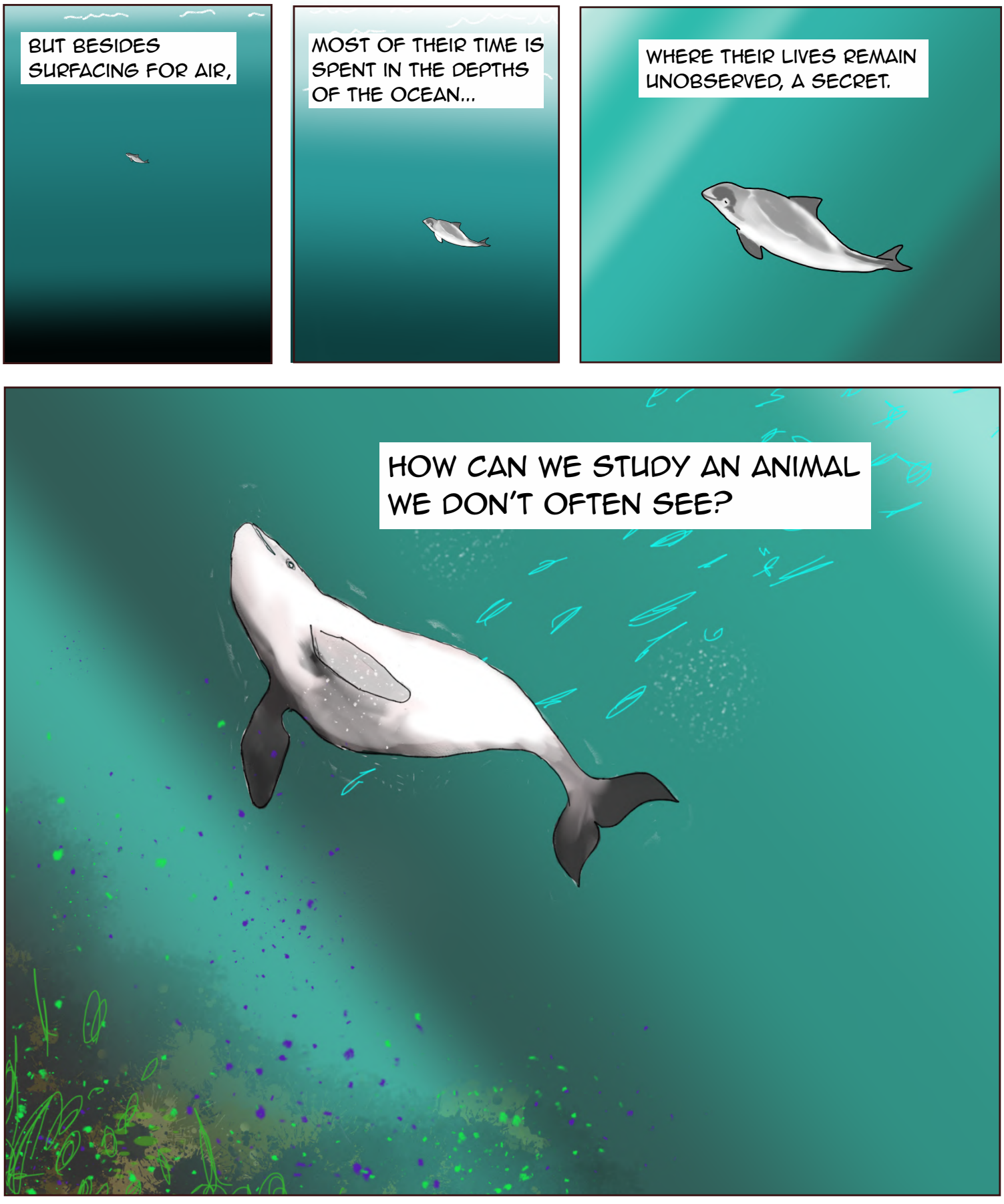


*KEENER ET AL. AQUATIC MAMMALS 2018

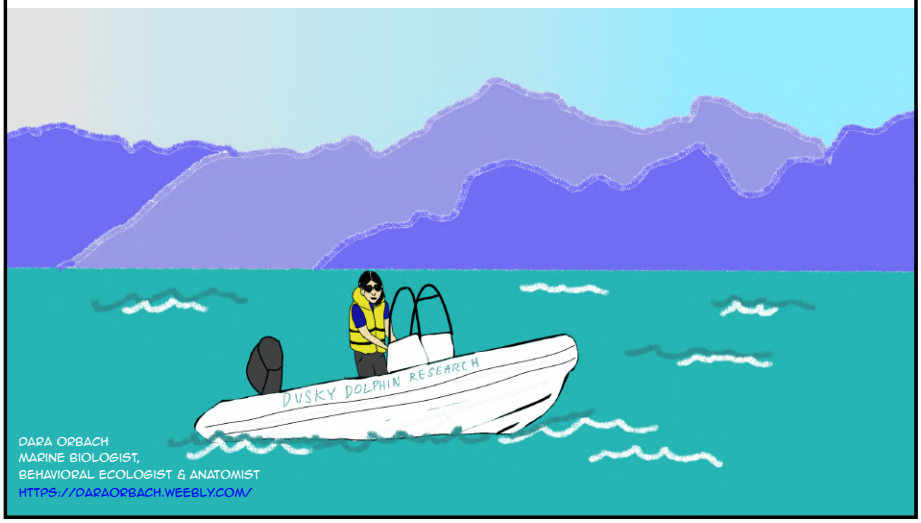
THIS ***LEFT-SIDE BIAS*** IS UNUSUAL–

–SO UNUSUAL THAT AMONG ALL MAMMALS, ***ONLY HARBOR PORPOISES*** BEHAVE LIKE THIS.

...BUT WHY?



DARA ORBACH, A BIOLOGIST AT TEXAS A&M, CORPUS CHRISTI, HAS DEVOTED HER CAREER TO UNDERSTANDING THE REPRODUCTIVE BEHAVIORS OF CETACEANS.

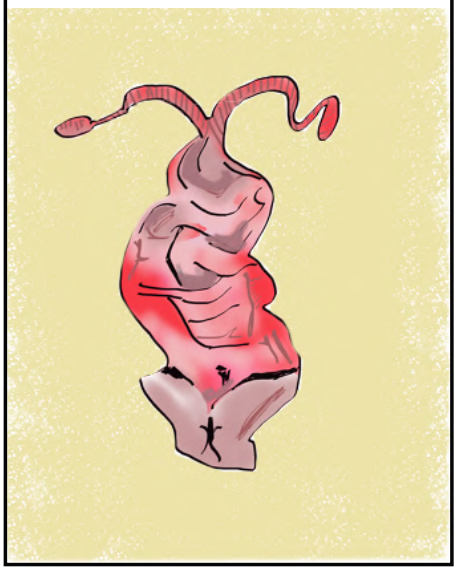


DURING HER PHD WORK, DARA HAD BECOME AN EXPERT IN CETACEAN REPRODUCTIVE ANATOMY AS WELL.

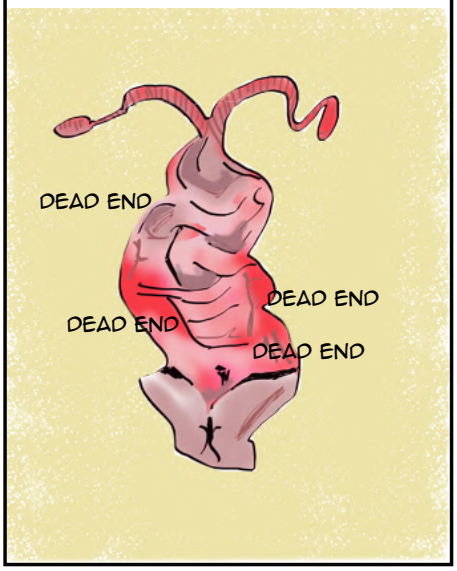
EXPERT→

DARA HAD FOUND THAT ***UNLIKE MOST OTHER MAMMALS*** THAT HAVE A SIMPLE FEMALE ANATOMY...

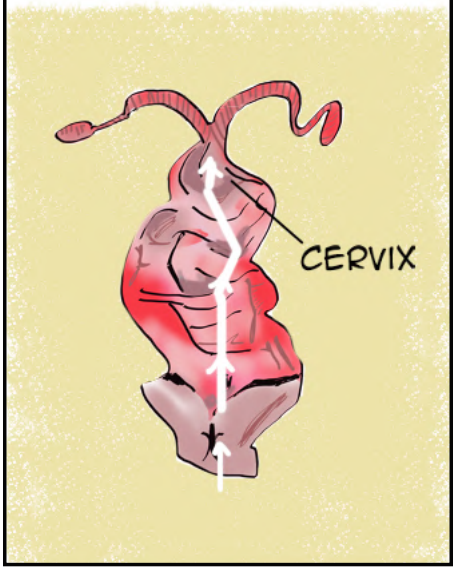
...FEMALE HARBOR PORPOISES HAVE A HIGHLY CONVOLUTED REPRODUCTIVE TRACT.

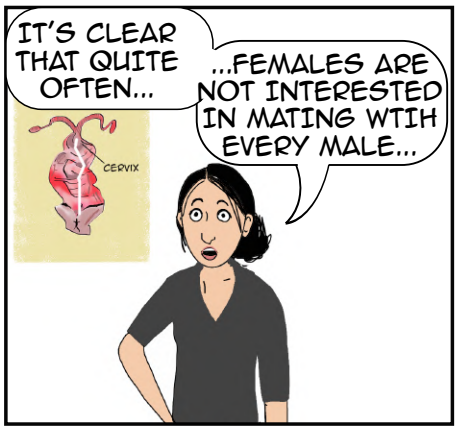


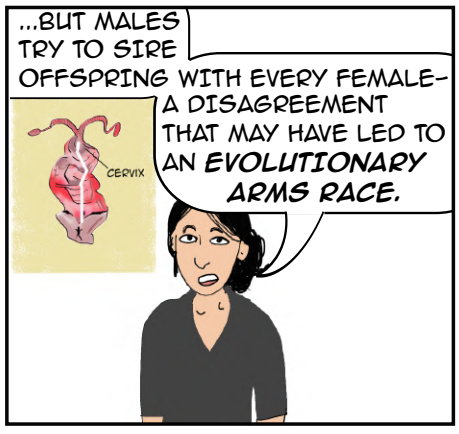
INSTEAD OF A SIMPLE PASSAGE FROM VAGINAL OPENING TO CERVIX, THEY HAVE A COMPLICATED MASS OF TUNNELING FOLDS...

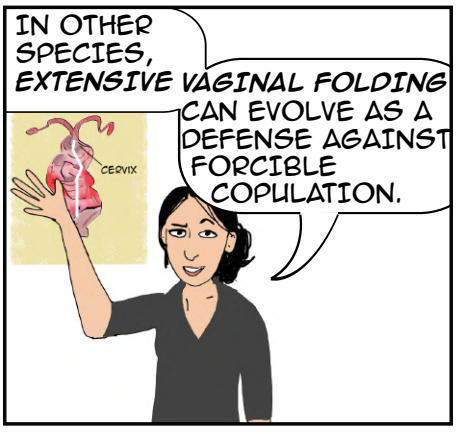


...MANY OF WHICH LEAD TO DEAD ENDS. ONLY ONE TUNNEL CORRECTLY LEADS TO THE CERVIX.









WHEN WE LOOK AT THE THE MALE REPRODUCTIVE ORGAN-A FIBROELASTIC TISSUE RESISTANT TO BENDING-

-WE SEE IT IS EXTREMELY ASYMMETRICAL.

IF THE FEMALES' ***EXTENSIVE VAGINAL FOLDING*** EVOLVED AS A DEFENSE AGAINST FORCED MATING...

CERVIX

...COULD THE LEFT-HANDED MATING BIAS...

...PREDICT THE ANGLE NEEDED FOR ***OPTIMAL PENETRATION?***

DARA AND HER COLLABORATORS DISSECTED OUT THE REPRODUCTIVE TRACTS OF POST-MORTEM HARBOR PORPOISES.

OF HARBOR PORPOISES

THEY INFLATED THE EXCISED PENISES WITH ***SALINE PUMPED FROM A KEG*** TO SIMULATE ERECTIONS...

AN INFLATED HARBOR PORPOISE PENIS
FROM ORBACH *ET AL. PROC. R. SOC. B.*, 2017

...AND THEY ALSO CREATED MOLDS OF THE VAGINAL TRACTS USING ***DENTAL SILICONE.***

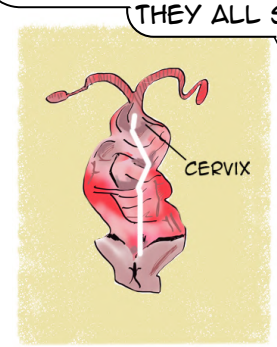
A SILICONE MOLD OF THE VAGINAL TRACT
FROM ORBACH *ET AL. PROC. R. SOC. B.*, 2017

FINALLY, THEY CAREFULLY INSERTED INFLATED PENISES INTO EXCISED VAGINAL TRACTS -

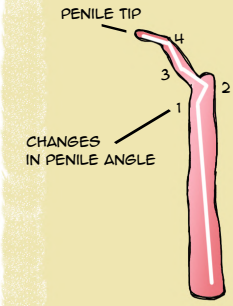
-AND USED ***CT SCANNING*** TO INVESTIGATE THE OPTIMALITY OF DIFFERENT ANGLES OF PENETRATION.

CT SCAN OF PENIS INSIDE OF VAGINA.
FROM ORBACH *ET AL. PROC. R. SOC. B.*, 2017

WE QUANTIFIED THE ASYMMETRY OF THE HARBOR PORPOISE VAGINAL TRACTS, FINDING THEY ALL SPIRALED ***TO THE LEFT.****



SIMILARLY, THE INFLATED PENISES ALL HAD A ***LEFTWARD CANT*** IN THEIR SHAPE.*



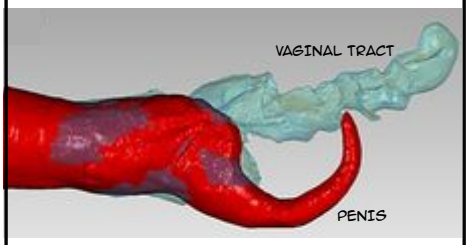
*ORBACH ET AL. SCIENTIFIC REPORTS, 2020

WHEN WE SCANNED INFLATED PENISES INSERTED IN VAGINAL TRACTS...

...WE FOUND THAT THE ***OPTIMAL ANGLE OF PENETRATION*** OCCURRED WHEN VAGINAL AND PENILE ASYMMETRIES WERE ALIGNED...

...POTENTIALLY ALLOWING MALES TO ***PENETRATE DEEPER*** INTO THE VAGINAL TRACT AND IMPROVE THEIR CHANCE OF INSEMINATING THE FEMALE!**

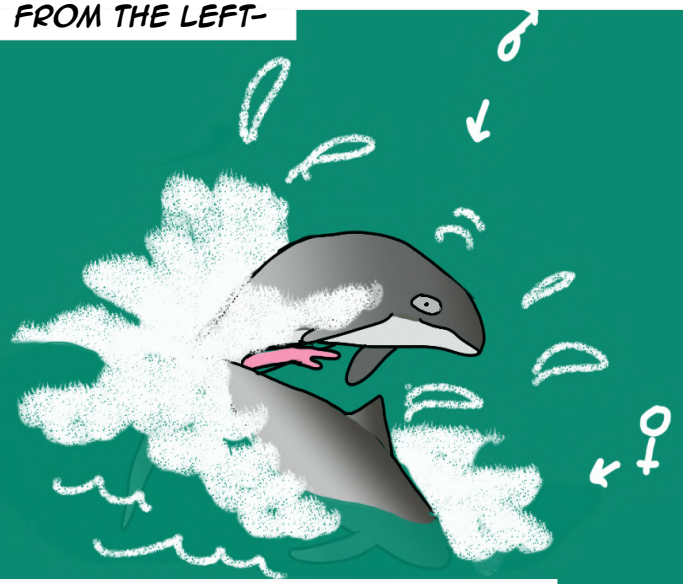
BY CONTRAST, OTHER ANGLES OF PENETRATION THAT ***DIDN'T*** LINE UP MORPHOLOGICAL ASYMMETRIES...



...INHIBITED THE PENIS FROM NAVIGATING THE CONVOLUTED VAGINAL FOLDS.**

**ORBACH ET AL. PROC. R. SOC. B, 2017

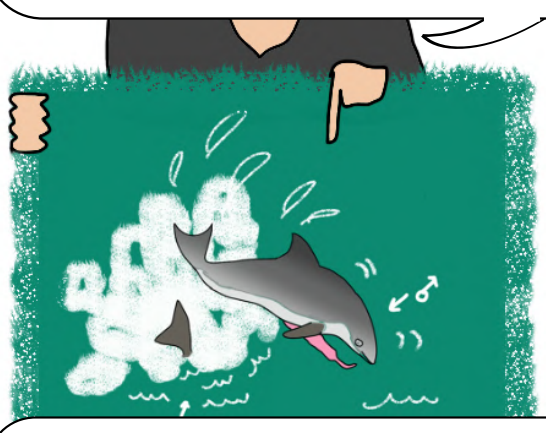
THE BODY POSITIONING THAT ALLOWS FOR THE OPTIMAL ANGLE REQUIRES THAT A MALE PORPOISE PENETRATE THE FEMALE ***FROM THE LEFT-***



-CORRESPONDING EXACTLY WITH THE ***LEFT-SIDED MATING BEHAVIOR*** WE SEE IN THE FIELD.

IT SEEMS THAT THE LEFT-SIDED BIAS OF MALE MATING BEHAVIOR HAS ***COEVOLVED*** WITH GENITAL SHAPE TO ALLOW THE PENIS TO CIRCUMVENT COMPLEX VAGINAL FOLDING!

THIS ALSO MEANS THAT FEMALES MIGHT HAVE ***MORE CONTROL OVER PATERNITY*** THAN WE'VE PREVIOUSLY THOUGHT-

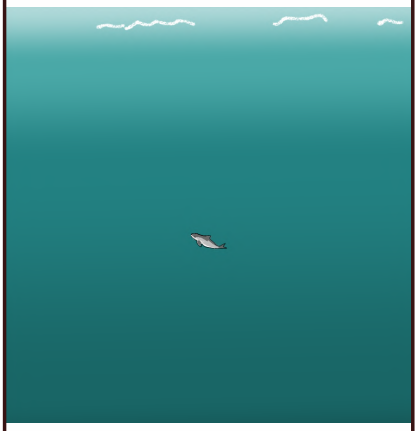


-BY ANGLING HER BODY IN A WAY THAT DOESN'T PROPERLY ALIGN MALE AND FEMALE GENITALIA, SHE MAY BE ABLE TO PREVENT COPULATION OR INSEMINATION!

IT'S LIKE PAT BENATAR SINGS...

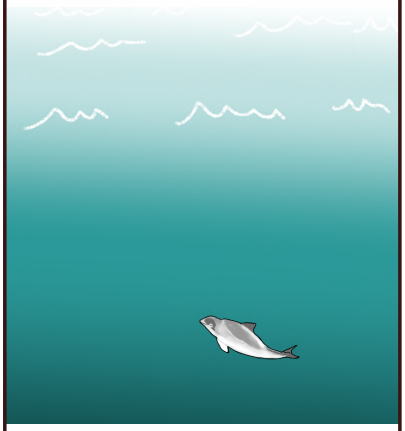
*SEE "SEXUAL CONFLICT" FROM PAGE 1

BY COMBINING WHAT WE HAVE LEARNED ABOUT PORPOISE MORPHOLOGY AND BEHAVIOR...



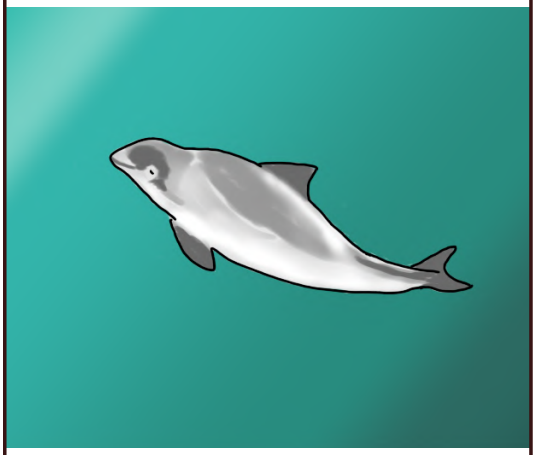
...WE CAN HYPOTHESIZE ABOUT THE SECRET LIVES OF HARBOR PORPOISES.

SO...CAN FEMALES CONTROL PATERNITY OF THEIR OFFSPRING?



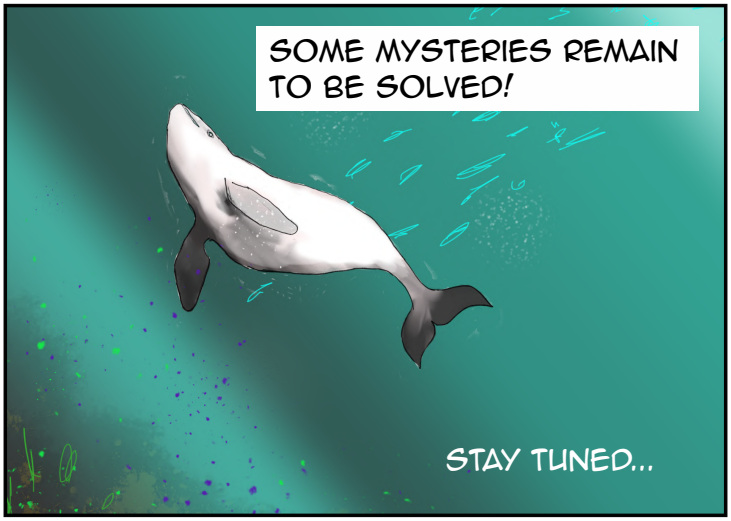
AND WHICH CAME FIRST: THE MATING BEHAVIOR OR THE GENITALIA??

IT REMAINS CHALLENGING TO TEST THESE IDEAS...



...BUT WE KEEP SEARCHING FOR NEW CREATIVE WAYS TO TEST OUR HYPOTHESES!

UNTIL THEN...



THANKS FOR READING!

THIS WORK WAS PRESENTED AT THE ANNUAL MEETING OF THE ***SOCIETY FOR INTEGRATIVE AND COMPARATIVE BIOLOGY*** IN AUSTIN, TEXAS, JANUARY 3-7 2020.

READ MORE ABOUT THIS TOPIC:

1. DR. ORBACH'S WEBSITE: HTTPS://DARAORBACH.WEEBLY.COM/
2. SICB WEBSITE: HTTP://WWW.SICB.ORG/
3. ORBACH *ET AL.* 2017. GENITAL INTERACTIONS DURING SIMULATED COPULATION AMONG MARINE MAMMALS. *PROCEEDINGS OF THE ROYAL SOCIETY B.*
4. KEENER *ET AL.* 2018. THE SEX LIFE OF HARBOR PORPOISES (PHOCOENA PHOCOENA): LATERALIZED AND AERIAL BEHAVIOR. *AQUATIC MAMMALS*
5. ORBACH *ET AL.* 2020. ASYMMETRIC AND SPIRALED GENITALIA COEVOLVE WITH UNIQUE LATERALIZED MATING BEHAVIOR. *SCIENTIFIC REPORTS.*