Seabird Ecology & Conservation (MARS6040_4040) Quiz #2: morphometrics / necropsies / lectures

Student name: _____KEY_____

This 30-minute quiz is worth 5 points. I have extra paper, if you need. Write your name on every extra page and staple them together with this cover page.

1) **Definitions:** Define the following terms using the words provided (in brackets). Make sure you provide explicit diagnostic features / characteristics, to get full credit (+0.2 each)

   - Sexual dimorphism (percentage): The difference in the measurement of a morphological trait (e.g., body mass, tarsus length), between males and females of the same species. Sexual dimorphism is considered as a difference in the means of the male / female traits by 5% or more. Because sexual dimorphism is expressed as the ratio of the larger / smaller sex, a ratio of 1.2 of larger is considered evidence of sexual dimorphism.

   - Down (rachis): A type of modified feather where the rachis is largely reduced, or completely absent. Used for insulation, by trapping air.

   - Pterylae (tract):
     Any of the tracts of skin that bear contour feathers, arranged in lines along the body of a bird

     Feathers are not attached to birds in a random manner over the entire body of the bird. Instead they are usually found in often linear tracts celled **pterylae**.

     The spaces on the bird's body without feather tracts are referred to as **apteria**.

     The densest area for feathers is often on the bird's head and neck.

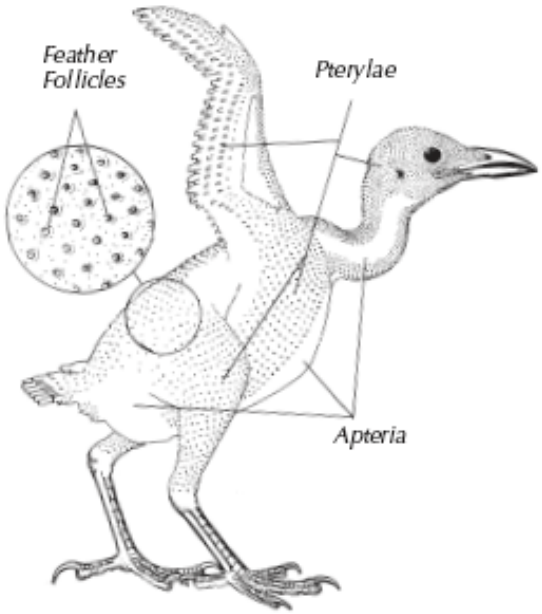
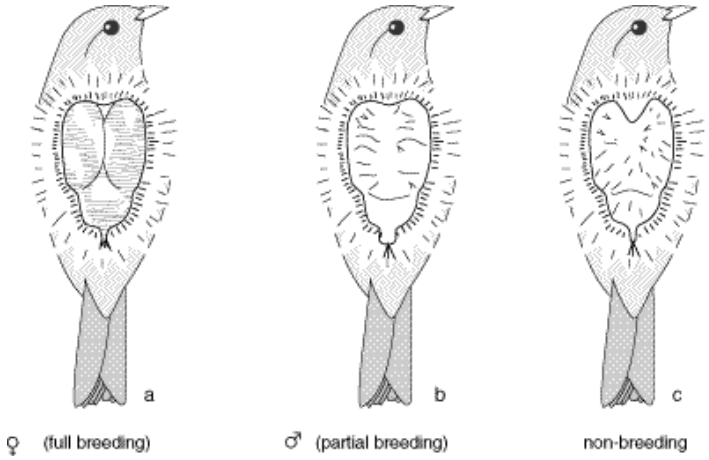


Figure 3–1. Distribution of Feather Tracts on Plucked Bird: *Dots represent feather* ***follicles****, sites of attachment of feathers. Groups of dots, often in a linear pattern, are feather tracts, termed* ***pterylae****. Featherless areas between tracts are* ***apteria****.*

- Brood patch (incubation):

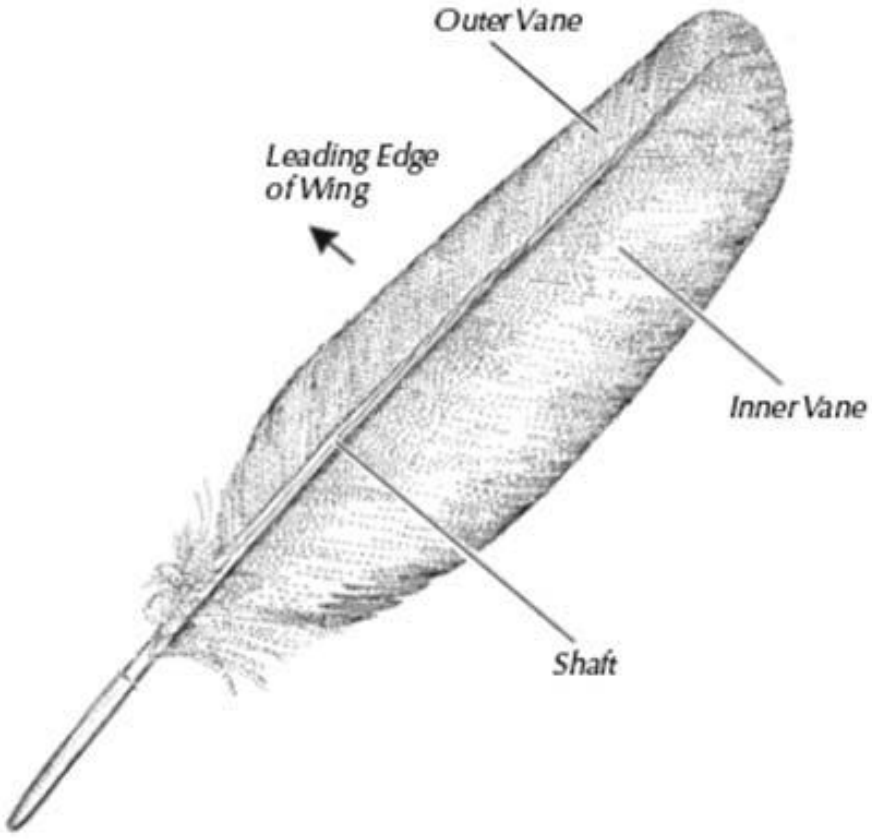
Breeding birds lose feathers on certain areas of their underside to transfer heat more efficiently to their eggs (and chicks) during incubation and brooding.



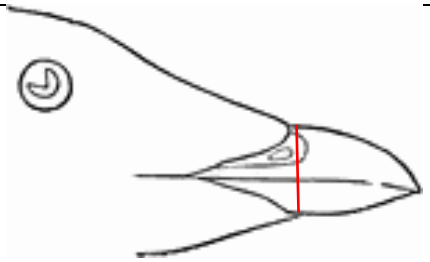
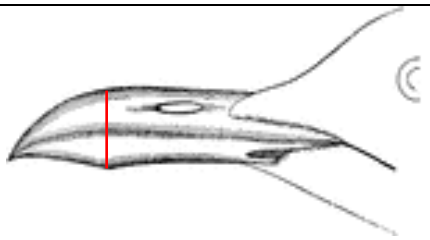
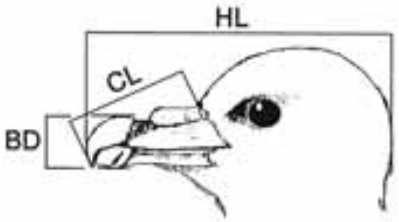
- Contour feather (shape):

The outermost feathers that give birds their shape and color. They also keep birds dry and insulated. NOTE: certain contour feathers are used in flight (primaries / secondaries / remiges).

2) Draw a flight feather (+0.1) and label the following: shaft, calamus, rachis, vane (+0.1 each)



3) Draw the following morphometric measurements and provide a brief explanation. Note, make sure you include and label any key features needed to interpret your drawings (+0.25 each).

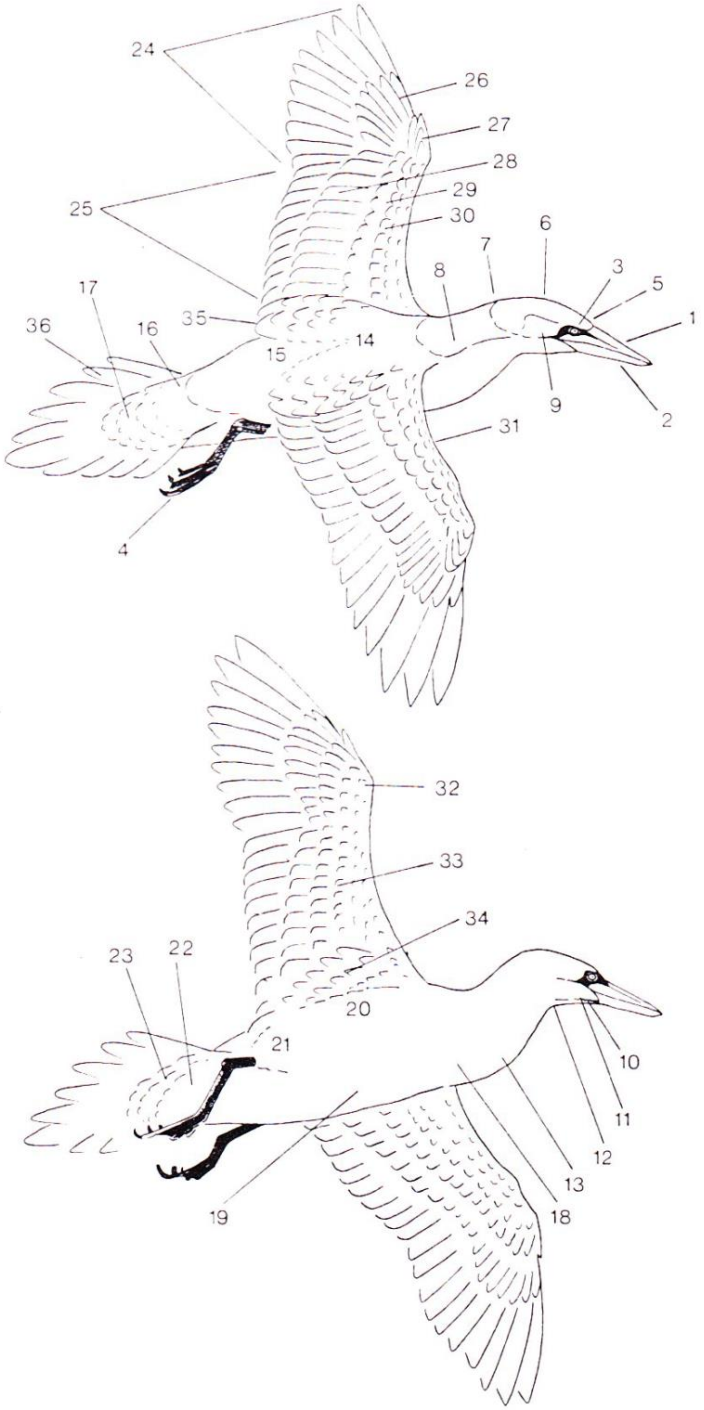
Explanation:	**Drawing:**
Culmen length: Linear distance from tip of the bill to where the top of the bill meets the feathers	
Bill depth at base: Linear distance from the top of the bill to the bottom of the bill where the bill meets the feathers	
Bill depth: Linear distance from the top of the bill to the bottom of the bill at the gonys	
Head length: Linear distance from the back of the head to the tip of the bill	 Head length is HL

4) Answer these wedge-tailed shearwater (wedgy) natural history questions (+0.10 each)

- How many wedgie color morphs are there in Hawai'i? __2____
- When do wedgies lay their eggs (months)? ____June (incubate June – Aug)_____
- When do wedgies eggs hatch (months)? ____late July – late August (chicks July – Dec)_
- When do wedgy chicks fledge (months)?_____Nov - Dec_____

5) Name the following part s of this bird (+0.05 each, 0.5 total):

- 4: __legs/feet_____
  27: __alula_____
- 24: _primaries_____
  25: __secondaries____
- 16: ___rump___
  17: ___uppertail coverts___
- 6: ___crown____ (head: half credit) 7: ___nape__
- 36: ____tail / retrices___
  26, 28, 29, 30: ___coverts___



5) Briefly explain three applications of morphometric measurements to study seabirds, and provide a specific example from the readings or from lecture (+0.1 for each):

Application	**Specific Example**
Identify species, subspecies, and/or populations	Hawaiian Petrels from Maui and Hawai'i are different, and may need to be managed separately Many other examples
Determine age class of birds (e.g., bycatch) or	Control for tag effects on chick development

development of chicks (e.g., tagging studies)	Many other examples
Assess body condition at once or over time, of individuals or of entire colonies	Determine chick condition / growth, such as at Blackpoint Many other examples

Other applications:

- assess SSD of different traits within species and across locations
- assess morphological differences relative to ecological differences
- compare wing eco-morphology of closely-related species

6) Provide one example of seabird families or sub-families with male-biased and female-biased SSD (+0.1 each). Ask for more paper – if you need more room.

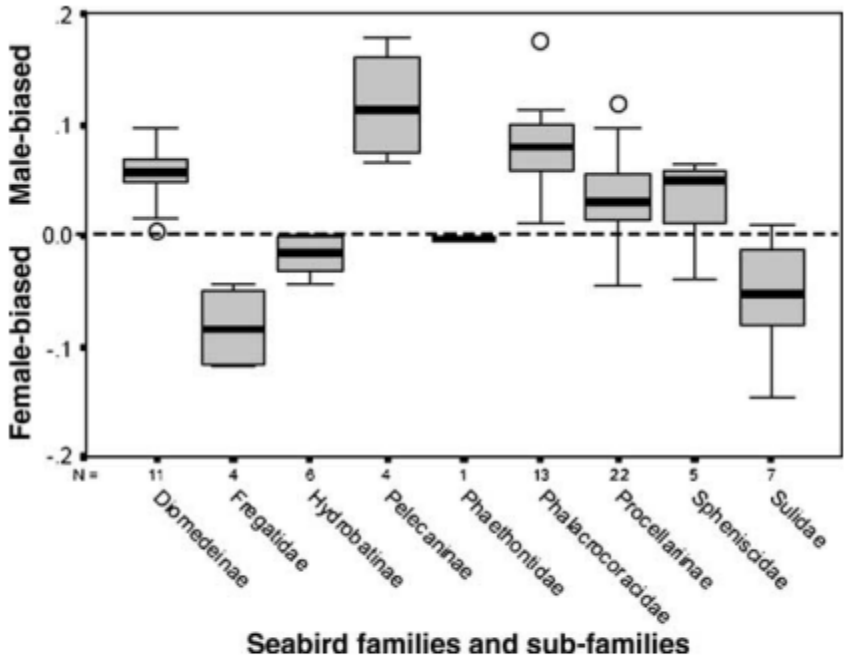


Fig. 2. Sexual size dimorphism in body mass of seabird families and sub-families (median, lower and upper quartiles; whiskers are extremes). N denotes the number of species in each family (or sub-family), and the dotted line represents monomorphism.

Male-biased SSD:
- Albatrosses
- Cormorants
- Pelicans
- Petrels
- Penguins

Female-biased SSD:
- Boobies
- Frigatebirds
- Storm petrels

No SSD:
- Tropicbirds

- Name and briefly explain three hypotheses for sexual size dimorphism (SSD) in birds (+ 0.2 each). Based on the results of the paper from Serrano-Meneses, M.A., & Szekely, T. (2006), which one of these three hypothesis best explains SSD in seabirds (+ 0.2)?

Niche selection – males and females use different niches (resources) to reduce intraspecific competition and increase foraging efficiency.

Sexual selection – Female selection leads to higher quality (and often larger) males. Males tend to be larger in species that engage in ground displays and tend to be smaller in species that engage in aerial displays.

Fecundity selection – Females tend to be larger to produce larger, higher quality eggs/chicks.

According to this paper, sexual selection best explains SSD in seabirds. The paper tested only sexual selection and fecundity selection; it did not address niche selection. The data contradicted the fecundity selection model and supported the sexual selection model.