EXAM III-B. BIO 213. SPRING 2004 Name:

The exam is worth 100 points. It consists of 36 multiple choice questions worth 2.5 points each and 2 brief answer questions worth 5 points each. You will be given a choice of four brief answer questions, choose the two that you feel more comfortable answering. There are no extra-points. Read carefully each question and make sure you correctly fill your answer in the scantron. Also, fill in your name and **UT-eID** correctly. You have until 12:00 PM to work on your exam. Hint: Answer first all the questions you are confident of knowing, then concentrate on those that you are confused, finally guess on those that you do not know (you may get lucky).

1. This component of a life history defines the age at first reproduction in an organism.
a) fecundity b) aging c) fecundity d) parity e) maturity

2. In life histories, a trade-off is
a) a compromise in the allocation of resources during an individual's life time.
b) a response of form and function to the environment.
c) the number of episodes of reproduction.

3. The life history of an individual sperm whale is entirely defined by its genotype.
a) True b) False

4. In plants, a life history strategy that involves growing slowly, conserving resources and having low reproductive rates is likely to be found under
a) conditions of low disturbance and low stress.
b) conditions of high stress and low disturbance.
c) conditions of high disturbance and low stress.

5. Among vertebrates, the animals with the highest variation in life history strategies are
a) fishes b) mammals c) reptiles d) birds

6. The Scissor-tailed Flycatcher is a Neotropical migrant bird that stops growing after its first year, its age at first reproduction is likely to be determined
a) by the trade-off between current reproduction and future survival.
b) by the age at which growth maximizes fecundity.
c) by none of the above

7. A barnacle is an organism that continues growing throughout its life and has a long life expectancy. Throughout its life, it will favor
a) fecundity over growth each year. b) growth over fecundity each year.
c) fecundity and growth each year.

8. A researcher is interested in understanding how the community structure of plants affects the flow of nutrients and water in a locality found along the Edwards Aquifer. What kind of ecology is she/he pursuing?
a) community ecology b) population ecology c) ecosystem ecology

9. This abiotic factor affects all biological processes (metabolism) within an organism
a) temperature b) salinity c) sunlight d) water

10. In average, the climate within the US and Canada is colder and drier compared to the climate in Colombia and Venezuela.
a) True b) False

11. The angle of incoming sunlight relative to the Earth's surface is _____ at the Equator
a) obtuse b) perpendicular c) oblique

12. One of the consequences of the movement of the Earth around the sun and the 23.5° tilt of the Earth on its axis is that in June, the _____ is farther away from the sun.
a) northern hemisphere b) equator c) southern hemisphere

13. At 30° latitude, deserts are formed within the northern and southern hemisphere as a result of the
a) sinking dry and cool atmospheric air sucking up the moisture from the land.
b) high intensity of solar radiation in these latitudes.
c) unavailability of nutrients in the soil that preclude the growth of tall canopy trees.

14. Within tropical latitudes in Mexico, you can find climates and biomes similar to those found in Canada. These phenomena is mainly the result of the
a) modification of the global climate pattern due to high elevation in mountainous areas.
b) modification of the global climate pattern due to large ocean areas surrounding land masses in Mexico.
c) modification of the global climate pattern due to a rain-shadow effect.

15. All of the factors below *directly* affect soil characteristics, *except*:
a) temperature b) precipitation c) topography d) vegetation
e) atmospheric oxygen

16. The main characteristic defining these biomes is sparse rainfall.
a) deserts b) tropical forests c) tundra d) chaparral

17. In these biomes the canopy is made up of trees bearing cones.
a) tropical forests b) deciduous forests c) coniferous forests

18. The patterns of precipitation across the earth influence the variation of _____ in the oceans.
a) temperature b) oxygen c) salinity d) light

19. Winds traveling from within continental land masses towards the shore trigger the development of
a) ocean currents. b) upwelling. c) tides.

20. These marine habitats are found in the neritic-benthic zones of oceans.
a) kelp forests and coral reefs b) sandy beaches c) deep-sea benthos

21. Social behaviors could favor the observation of _____ dispersion among individuals in a population inhabiting a homogeneous environment.
a) clumped b) uniform c) random d) high

22. The distribution limits of a population(s) of a given species is determined by
a) lack of suitable habitat. b) competitors. c) diseases. d) all of the above

23. At large scales, individuals within population(s)
a) are distributed in clumps with many individuals concentrated in few localities.
b) are distributed evenly across the geographic range.
c) are distributed among *many* hot-spots across the range.

24. In this model of population distribution across heterogeneous landscapes, individuals occupy patches of different habitat quality.
a) source-sink model b) metapopulation model c) landscape model

25. Dispersal is an important phenomena in population ecology because
a) it links the dynamics of populations.
b) it can determine the abundance and distribution of populations.
c) all of the above

26. A star fish population reproduces annually, the potential for the population to grow under ideal, unlimited conditions is better modeled by
a) geometric equations. b) logistic equations. c) exponential equations.

27. During exponential population growth when r_{max} increases, dN/dt
a) decreases. b) increases. c) stays the same. d) gets to zero.

28. In logistic population growth when $N = K$, dN/dt
a) is zero. b) is positive. c) is negative. d) decreases.

29. Carrying capacities are constant through time and space.
a) True b) False

30. In logistic population growth as N increases $K\text{-}N/K$
a) increases. b) decreases. c) stays the same.

31. This type of social behavior has never been recorded in nature.
a) cooperation b) spitefulness c) altruism d) selfishness

32. These contests involve organisms defending an area or space from other individuals.
a) territoriality b) dominance hierarchy c) male-male competition

33. In _____ there is a negative fitness increment in the donor and a positive fitness increment in the recipient of the behavior.
a) altruism b) selfishness c) cooperation d) spitefulness

34. The evolution of cooperation and altruism involves
a) the operation of kin selection and gains in inclusive fitness for the donor.
b) the operation of kin selection and gains in fitness for the donor.
c) the operation of natural selection and gains in fitness for the donor.

35. The long tail of a male peacock is used to attract females. It
a) is an example of a secondary sexual character. b) probably evolved as a result of mate choice. c) all of the above

36. Sexual selection was proposed by Darwin to explain the evolution of secondary sexual characteristics.
a) True b) False

Choose 2 of the following brief answer questions. Restrict your answers to the space below. Circle the number of the question you have chosen to answer.
1. In the development of the exponential model of population growth, why can *B* and *D* be substituted by *bN* and *dN*, respectively?
2. Illustrate with a graph, the pattern of population growth predicted by the exponential and logistic model. Label correctly the x, y axis, and each curve of growth.
3. List three biomes found in North America and three biomes found in Asia.
4. Mention two examples of species that engage in eusociality (altruism).