RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

B.Sc. (Four Year) Degree in Applied Sciences
Third Year - Semester II Examination – February/March 2019

BDC 3204 – WILDLIFE MANAGEMENT AND CONSERVATION

Time: Two (02) hours

Answer ALL questions.

1. The following question is based on the work of Wort *et al.*, 2018 published in the *Journal of Biogeography* on the genetic structure of sympatric congeneric gastropods. Field surveys were conducted to assess the presence/absence and the abundance of *Steromphala umbilicalis* and *S. pennant* at 23 localities along ~1,800 km coastline, ranging from the north-west Iberian Peninsula to the southern British coastline (Figure 01). Standard population genetic analyses to compare patterns of genetic differentiation between species in relation to the field surveys, results of which are given in Table 01. Figure 01 and Table 01 are annexed.

   a) Comment on the distribution, relative abundance and level of ecological specialization of the two species of mollusks.

   (10 marks)

   b) Comment on the variables that are used in the calculation of F_{st} and how they influence F_{st} values.

   (40 marks)

   c) Comment on the F_{st} values of the two species in the above study and give plausible explanations for the observed pattern.

   (50 marks)

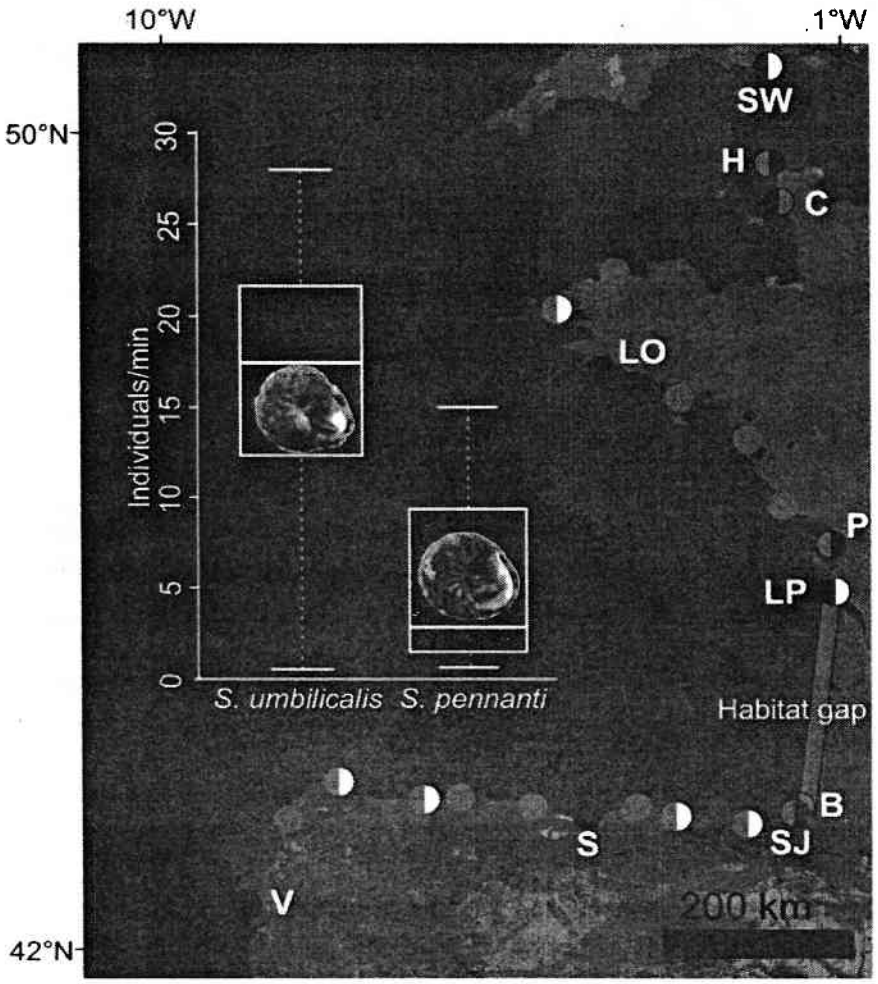

Figure 01. Map displaying sampling localities on the north-east Atlantic coasts of the Iberian Peninsula, France and the British Isles as circles, and abundance box plots for localities where both species were present (n = 16). Left semi-circles represent *Steromphala umbilicalis*, right semi-circles represent *Steromphala pennanti*: white = absent; grey = present; black = present and used as DNA sample locality.

Table 01. Pairwise comparisons of microsatellite genotypic differentiation (P-value) and F-statistics: localities north of the habitat gap in bold, sites ordered from south (top) to north (bottom); significant P-value following sequential Bonferroni correction marked with asterisk (*); F_{ST} WC = F_{ST} calculated according to Weir and Cockerham (1984); F_{ST} WC C = corrected F_{ST} WC values; species = U for *Steromphala umbilicalis* and P for *S. pennanti*. Where calculations gave negative F_{ST} values, these were reported as 0.

Localities	P-value	F_{ST} WC	F_{ST} WC C	Species
V & S	0.074	0.011	0.023	U
V & B	**0.004**	**0.023**	**0.023**	**U**
V & LP	0.046	0.007	0.007	U
V & LO	**0.126**	**0.004**	**0.005**	**U**
V & C	0.072	0.004	0.011	U
S & B	**0.178**	**0.000**	**0.010**	**U**
S & LP	0.629	0	0.006	U
S & LO	**0.189**	**0.009**	**0.017**	**U**
S & C	0.374	0	0.001	U
B & LP	**0.079**	**0.005**	**0.010**	**U**
B & LO	0.342	0.009	0.011	U
B & C	**0.613**	**0**	**0.009**	**U**
LP & LO	0.011	0.008	0.009	U
LP & C	**0.388**	**0**	**0.005**	**U**
LO & C	0.854	0	0.003	U
SW & V	**<0.001***	**0.066**	**0.052**	**U**
SW & S	<0.001*	0.082	0.104	U
SW & B	**<0.001***	**0.066**	**0.074**	**U**
SW & LP	<0.001*	0.075	0.074	U
SW & LO	**<0.001***	**0.064**	**0.061**	**U**
SW & C	<0.001*	0.067	0.082	U
V & S	**0.003***	**0.014**	**0.016**	**P**
V & SJ	0.005	0.028	0.035	P
V & P	**0.124**	**0.023**	**0.017**	**P**
V & LO	0.078	0.014	0.017	P
V & H	**0.001***	**0.047**	**0.035**	**P**
S & SJ	<0.001*	0.052	0.071	P
S & P	**0.001***	**0.044**	**0.042**	**P**
S & LO	<0.001*	0.043	0.043	P
S & H	**<0.001***	**0.060**	**0.057**	**P**
SJ & P	0.474	0.000	0.012	P
SJ & LO	**0.021**	**0.019**	**0.029**	**P**
SJ & H	0.021	0.029	0.037	P
P & LO	**0.051**	**0.017**	**0.014**	**P**
P & H	0.189	0.016	0.012	P
LO & H	**0.055**	**0.007**	**0.008**	**P**