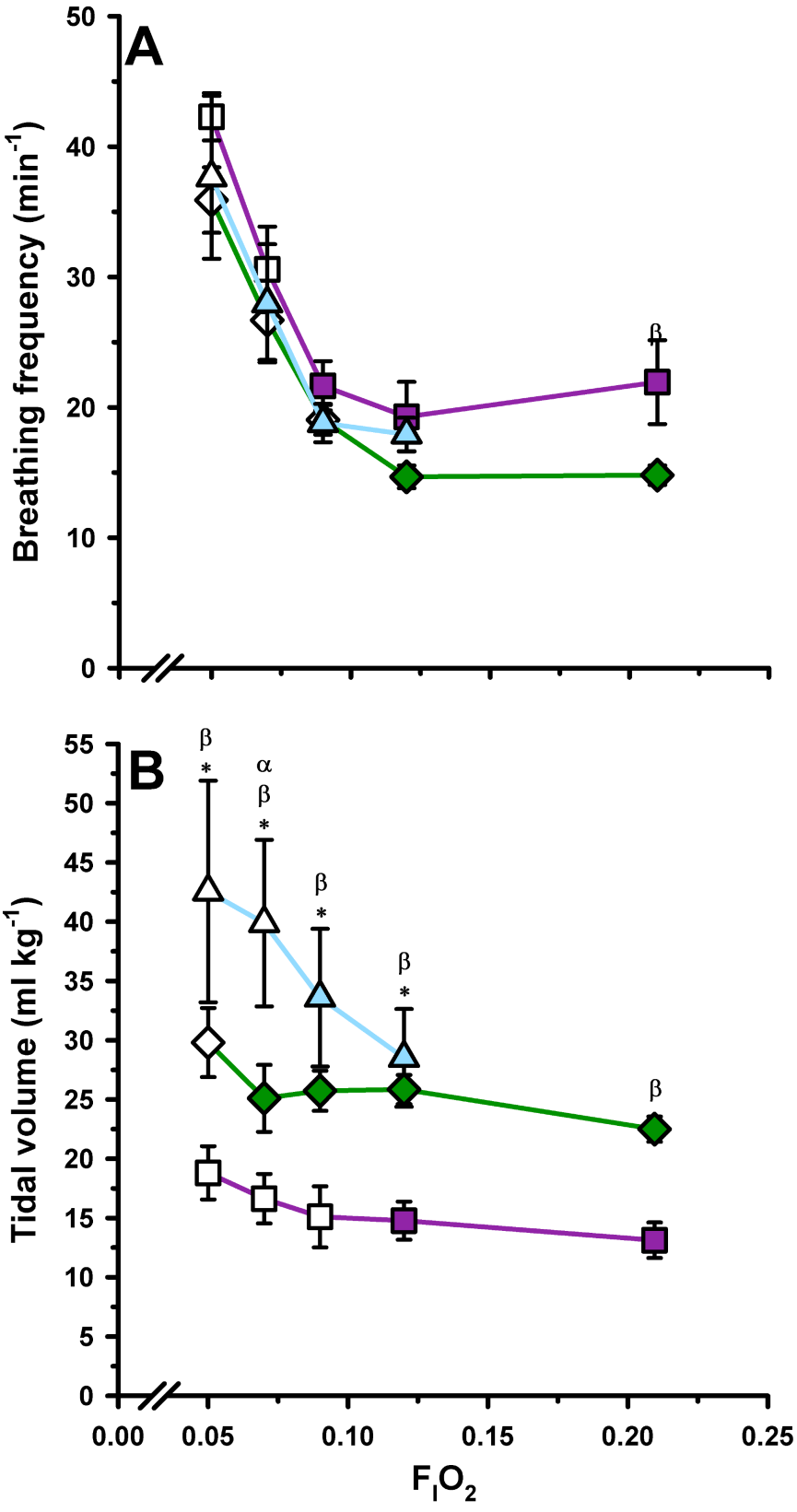
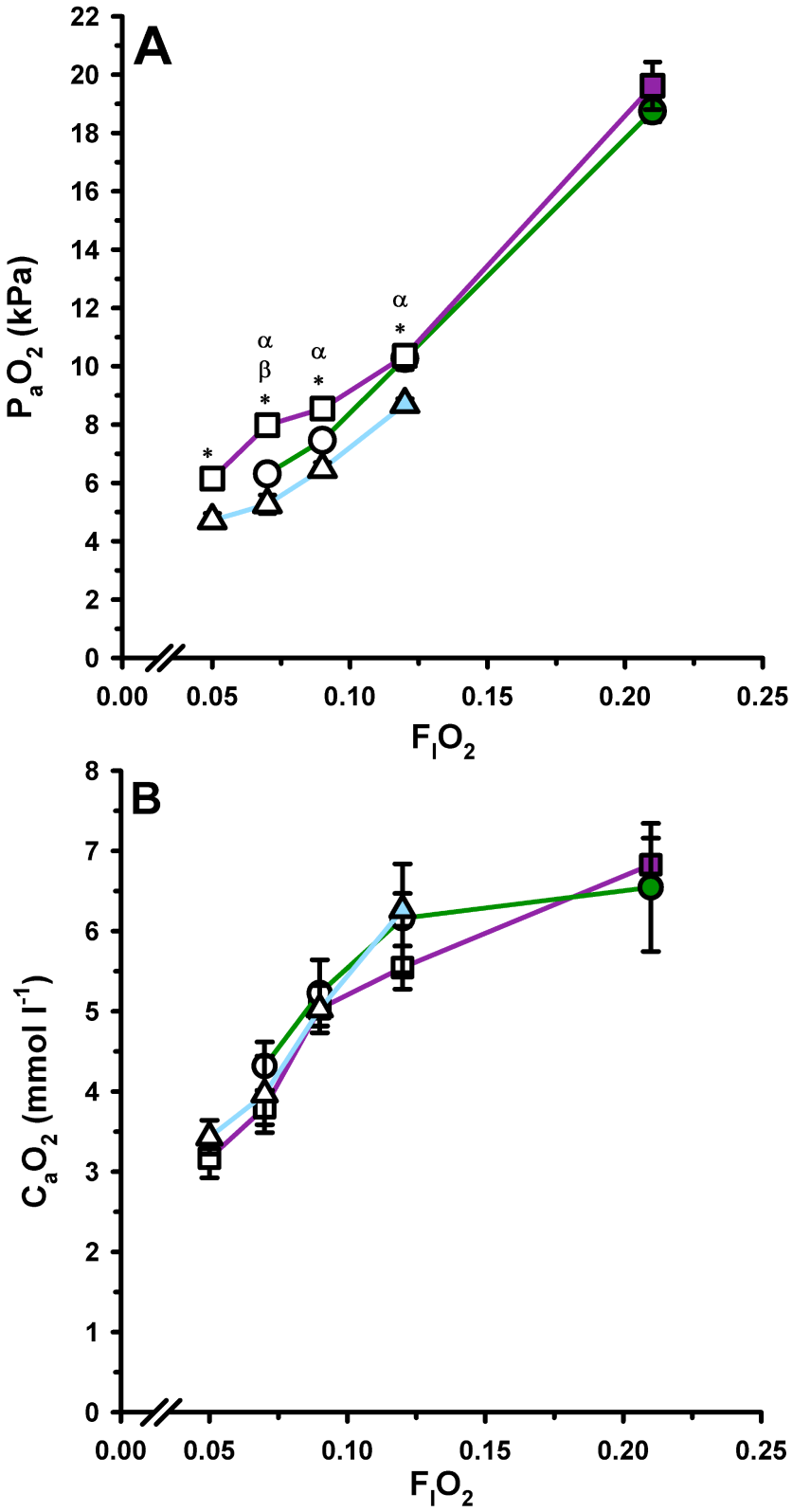
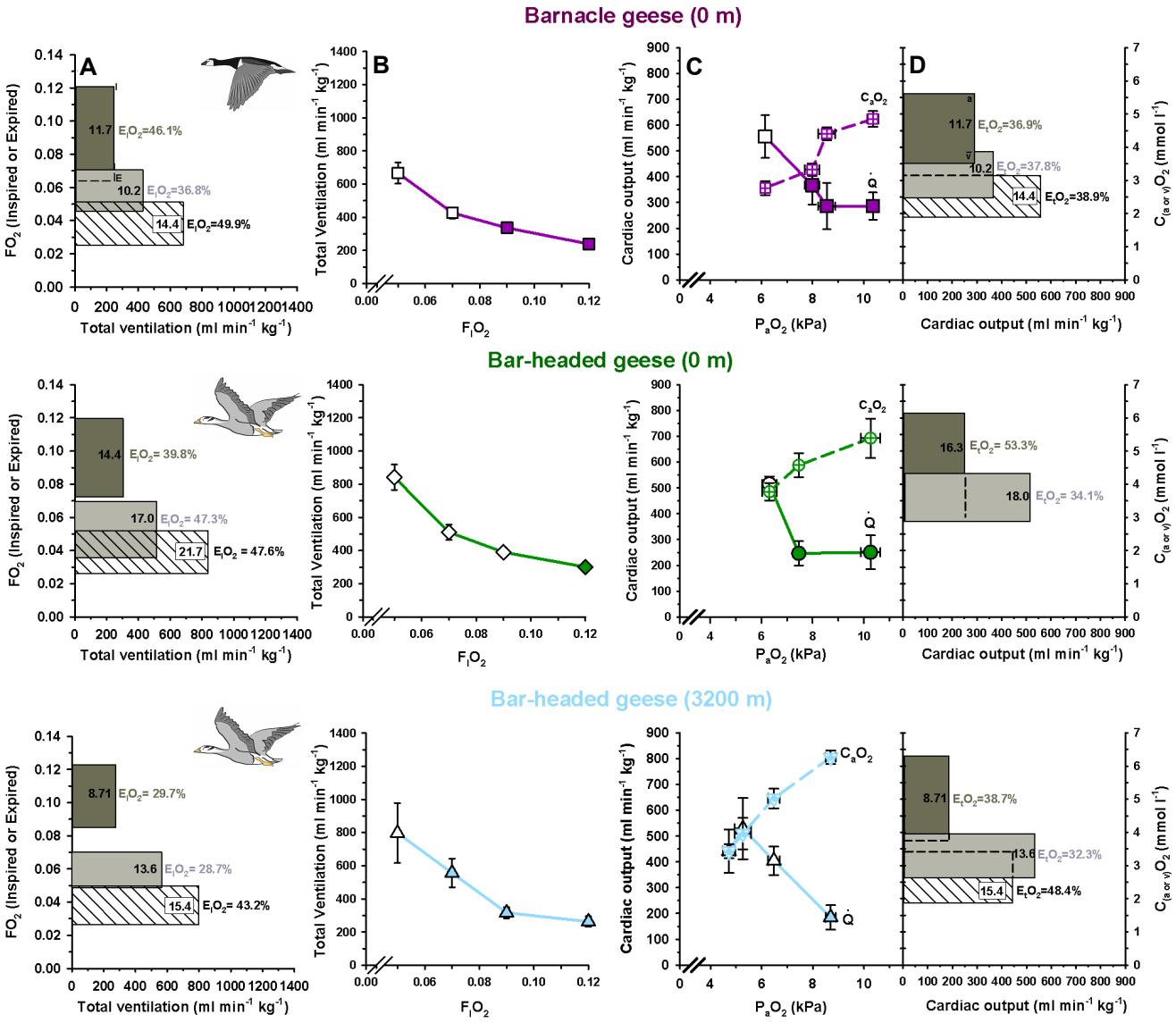
Supplementary Figures



Supplementary Figure S1: Changes in the components of total ventilation during progressive hypoxic exposure. (A) Breathing frequency was initially higher in barnacle geese, but increased in all groups throughout hypoxia exposure. (B) Tidal volume (in BTPS) was greater in magnitude in bar-headed geese than barnacle geese, though it increased in all groups. Values represent means $\pm$ s.e.m (blue triangle: high-altitude-reared bar-headed geese, N=5; green diamond: low-altitude-reared bar-headed geese, N=5; purple square: barnacle geese, N=7).). Significant differences ($P<0.05$) from values obtained with ambient exposure within a species are indicated by open symbols and determined by one-way repeated measured ANOVA. Significant differences ($P<0.05$) between species are determined by two-way repeated measures ANOVA and indicated by different symbols: *high-altitude-reared bar-headed geese versus barnacle geese, $^{\alpha}$high-altitude-reared bar-headed geese versus low-altitude-reared bar-headed geese, and $^{\beta}$low-altitude-reared bar-headed geese versus barnacle geese.



Supplementary Figure S2: The relationship of arterial partial pressure of oxygen and arterial oxygen content with inspired oxygen level throughout hypoxic exposure. (A) Arterial partial pressure of oxygen (P_aO_2) decreased with decreasing fractional oxygen composition of inspired gas (F_IO_2) in all groups, though high-altitude-reared bar-headed geese had a lower P_aO_2 at any given F_IO_2 than either low-altitude-reared group. Significant differences ($P<0.05$) in P_aO_2 between species are indicated by different symbols: *high-altitude-reared bar-headed geese versus barnacle geese, $^{\alpha}$high-altitude-reared bar-headed geese versus low-altitude-reared bar-headed geese, and $^{\beta}$low-altitude-reared bar-headed geese versus barnacle geese. (B) Arterial oxygen content (C_aO_2) decreased with decreasing F_IO_2. Values are means $\pm$ s.e.m (blue triangle: high-altitude-reared bar-headed geese, N=5; green diamond: low-altitude-reared bar-headed geese, N=6; purple square: barnacle geese, N=7). Significant differences ($P<0.05$) from ambient exposure performance within a species are indicated by open symbols and determined by one-way repeated measured ANOVA.


Barnacle geese (0 m)
A
B
C
D
11.7 EIO2=46.1%
10.2 EIO2=36.8%
14.4 EIO2=49.9%
FO2 (Inspired or Expired)
Total ventilation (ml min-1 kg-1)
Total Ventilation (ml min-1 kg-1)
FIO2
Cardiac output (ml min-1 kg-1)
CaO2
Q
PaO2 (kPa)
11.7 EtO2=36.9%
10.2 EtO2=37.8%
14.4 EtO2=38.9%
C(a or v)O2 (mmol l-1)
Bar-headed geese (0 m)
14.4 EIO2= 39.8%
17.0 EIO2= 47.3%
21.7 EIO2 = 47.6%
16.3 EtO2= 53.3%
18.0 EtO2= 34.1%
Bar-headed geese (3200 m)
8.71 EIO2= 29.7%
13.6 EIO2= 28.7%
15.4 EIO2= 43.2%
8.71 EtO2=38.7%
13.6 EtO2=32.3%
15.4 EtO2=48.4%

Supplementary Figure S3: A summary of the trends in the hypoxic ventilatory response and hypoxic cardiovascular response of bar-headed geese and barnacle geese. Graphs summarizing the hypoxic ventilatory responses and cardiovascular responses of barnacle geese (N=7), low-altitude-reared bar-headed geese (N=5), and high-altitude-reared bar-headed geese (N=5). The Y axis of the graphs in column A is the fractional composition of oxygen (F_IO_2). The top of each box is the inspired F_IO_2 while the bottom of each box is the expired F_IO_2. The difference between these two represents the amount of O_2 extracted from the respired gas (E_IO_2; %), while the number inside the box represents the area of box, which is equal to the oxygen consumption in ml O_2 min^{-1} kg^{-1} ($\dot{V}_R$ x F_IO_2 x E_IO_2). The shading of the boxes depicts different F_IO_2 levels: dark grey = 0.12, light grey = 0.07, and striped = 0.05 F_IO_2. The graphs in column B illustrate how total ventilation (in STPD) increased in each species with decreasing F_IO_2. The graphs in column C depict the relationship between cardiac output ($\dot{Q}$; solid symbols, left axis) and arterial oxygen content (C_aO_2; hatched symbols, right axis of column D) with arterial partial pressure of oxygen (P_aO_2) in each species. The Y axis of the graphs in column D is the C_aO_2. The top of each box is the C_aO_2, while the bottom of each box is the venous oxygen content (C_vO_2). The difference between these two represents the amount of O_2 extracted from the blood by the tissues (E_tO_2; %), while the number inside the box represents the area of box, which is equal to the oxygen consumption in ml O_2 min^{-1} kg^{-1} ($\dot{Q}$ x C_aO_2 x E_tO_2). The shading of the boxes depicts different F_IO_2 levels: dark grey = 0.12, light grey = 0.07, and striped = 0.05 F_IO_2. Significant differences ($P<0.05$) in values from those obtained at ambient exposure for $\dot{V}_R$ and $\dot{Q}$ within a species are indicated by open symbols in the graphs in columns B and C and determined by one-way repeated measured ANOVA.