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PRELIMINARY RESULTS CONCERNING THE GAS OF ARTERIAL AND VEINOUS BLOOD IN DELPHINUS DELPHIS AND STENELLA STYX (Cetacea Odontacetes)

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PRELIMINARY RESULTS CONCERNING THE GAS OF ARTERIAL AND VEINOUS BLOOD IN DELPHINUS DELPHIS AND STENELLA STYX, (Cetacea ; Odontacetes)

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Measurements of the gas content of the blood, of the acido-basic equilibrium, and of the lactic acid content, are indispensible in order to estimate the value of any method for restraining the animal, and for surveillance during the eventual operation. These measurements were the goal which we had set ourselves in this preliminary study on these two small odontocetes, of which the cardiovascular physiology is still quite badly known.

METHODS OF ESTIMATION

- PO_2 : Polarographic measurement with direct reading
- pH : Electrometric measurement
- PCO_2 and CO_3H^- : determination by Astrup's method : measurement of the pH of specimens of tonometric blood in the presence of two mixtures of gases containing a known percentage of CO_2, and reference to the diagram of SIGGAARD-ANDERSEN.

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- Lactic acid estimation : enzymatic determination and spectrophotometric reading with ultraviolet.

CONDITIONS FOR SAMPLING

After their capture the animals were placed in a tank under constant observation.

The samples were taken immediately as the animal was placed on an operating table, and before any other experiments. The place of sampling is specified for each of the animals.

RESULTS

- I - Arterial blood

- Animal 1 (sample taken at level of pectoral fin) 12-VII-1967 ;

  D. delphis ♀ ; Size : 172 cm ; Weight : 52 kg ; Respiratory rhythm : 3/min.

  - PO_2 : 66 mmHg ; pH : 7.08 ; PCO_2 : 53 mmHg ;
  - CO_3H^- : 15.5 mEq/l ; Lactic acid : 10 mg %

- Animal 2 (sample from median caudal artery) 23-VII-1967 ;

  D. delphis ♂ ; Size : 158 cm ; Weight : 43 Kg ; Respiratory rhythm : 4/min.

  - PO_2 : 88 mmHg : pH : 7.30 ; PCO_2 : 34 mmHg ;
  - CO_3H^- : 19 mEq/l ; Lactic acid : 31 mg %

- Animal 3 (sample from median caudal artery) 26-VII-1967 ;

  D. delphis ♀ ; Size : 155 cm ; Weight : 49 Kg ; Respiratory rhythm : 3/min.

  - PO_2 : 57 mmHg : pH : 7.38 ; PCO_2 : 34 mmHg ;
  - CO_3H^- : 19 mEq/l ; Lactic acid : 14 mg %

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- II - Veinous blood

- Animal 4 (sample from caudal vein) 21-VII-1967 ;

S. styx ♂ ; Size : 159 cm ; Weight : 56 kg ; Respiratory rhythm : 3/min.

- PO_2 : 32 mmHg ; pH : 7.08 ; PCO_2 : 53 mmHg
- CO_3H^- : 15.5 mEq/l ; Lactic acid : 35 mg %

- Animal 5 (sample from caudal vein) 20-VII-1967 ;

S. styx ♀ ; Size : 178 cm ; Weight : 65 kg ; Respiratory rhythm : 3/min.

- PO_2 : 42 mmHg ; pH : 7.15 ; PCO_2 : 57 mmHg
- CO_3H^- : 19.5 mEq/l ; Lactic acid : 15 mg %

- III - The other part of the project was to find whether the arterial blood underwent great changes in the course of a 20-second respiratory cycle. One had therefore in each case to take a specimen just after the inspiration, and a second just before the following movement :

- 1) PO_2 : 56 mmHg ; pH : 7.18 ; PCO_2 : 49 mmHg ; CO_3H^- : 17.5 mEq/l
- 2) PO_2 : 48 mmHg ; pH : 7.17 ; PCO_2 : 50 mmHg ; CO_3H^- : 17.5 mEq/l

CONCLUSIONS

These last results allow the deduction that if there is a great similarity among other (terrestrial) mammals, there is a risk of variation, especially in the PO_2 estimation, according to the instant in the respiratory cycle at which the specimen is taken.

On the other hand it seems to confirm that the methods of application used (operating table with a supple bed) have hardly been satisfactory as concerns

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the equilibrium of gases in the blood. In effect, those animals having a thoracic cage without rigidity and an important visceral bulk, have their pulmonary expansion compromised when they are out of water. One must note also that an animal under such conditions will be very sensitive to the slightest deficit of oxygen. An artificial ventilation must therefore be employed simultaneously, and begun as soon as possible, in all experimentation where the animal is out of its natural medium.

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