duct is lined with a moist membrane. By increasing the dead space per breath the animal can, therefore, increase the rate of pulmonary ventilation and hence evaporation without increasing the rate of alveolar ventilation. Shallow breathing as observed in polypnoea in our cow presumably increases the dead space per breath.

Summary. Increase in environmental temperature above 10°C. increased the respiratory frequency of 2 cows according to the Arrhenius equation with a temperature characteristic of 12 and 13 thousand calories respectively. Cooling the inspired air in a hot environment decreased the respiratory frequency as well as the rate of ventilation and increased the depth of breathing. Heating the inspired air in a cold environment did not significantly affect respiration. Shallow breathing at high frequency with increased dead space per breath enables an animal to combine a large total ventilation and evaporation of water with a relatively small alveolar ventilation.

8230 C

High-Titer Blood-Grouping Serum.

M. C. TERRY. (Introduced by W. H. Manwaring.)

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The importance of using only serum of high titer in determining human blood groups has been emphasized by Coca.[1] The risk involved in accepting a serum merely on correctness of type without attention to titer is shown by Coca's findings on examination of 16 sera in actual use in New York City, none of them coming up to his Grade I and only 4 to his Grade II.

Coca's standard for Grade I requires that a 1-4 suspension of cells be agglutinated macroscopically in one minute by a 1-4 dilution of the serum; by a 1-2 dilution for Grade II. Group "B" serum of acceptable titer (Grade II or better) is fairly common among persons of that relatively rare group. This cannot be said of Group "A", however. In either group a high-titer serum is the exception. It would seem, therefore, that a method for raising a low-titer serum to acceptable grade would be useful, particularly in the case of the usually low titer Group "A" serum.

[1] Coca, Arthur F., *J. Lab. and Clin. Med.*, 1931, **16**, 405.

Our method consists in repeatedly freezing and thawing a tube of the serum in an ice and salt mixture and recovering the lower portion of the contents of the tube after the last thawing. An indication of what takes place may be seen if, between freezings, the tube is gently tilted back and forth, whereupon a movement of heavy oily-looking streaks occurs between a darker colored lower portion and a lighter colored upper portion. Ultimately the lower portion becomes deeply colored and the upper portion colorless and the lower portion will be found to have a higher agglutinin titer than the whole serum had originally.

By this method we have obtained from a serum which originally did not agglutinate macroscopically in 1-4 dilution a product which agglutinated in 1-16 dilution.

We are informed that this technic was employed in Wassermann's laboratory between 1908 and 1910. It has also been used in chemical research to reduce the water content of certain non-colloid solutions. We owe our acquaintance with the method to a note by Plant[2] who has shown that it can be used to obtain hemolytic complement of high titer from guinea pig serum. We have confirmed his findings as to complement and also as to rabbit serum anti-sheep hemolysin.

8231 C

Takata-Ara Reaction in Obstructive Jaundice.

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The test that Takata[1] proposed was originally used to distinguish between lobar and lobular pneumonia and he reported the reaction with Ara[2] at this time on the serum in pneumonia and in cerebral spinal fluid as well, where it seemed to be of value in distinguishing between meningitis and luetic involvement of the central nervous system. The reason for the reaction was probably a protein-shift in the blood, according to most investigators and knowing that this occurs in many pathological conditions, Jezler,[3, 4, 5] Staub[6] and others

2 Plant, Arthur S., *Brit. Med. J.*, 1933, **2**, 414.

1 Takata, M., Tr. 6th Congress, Tokyo, F.E.A.T.M., 1925, **1**, 693.

2 Takata, M., and Ara, K., Tr. 6th Congress, Tokyo, F.E.A.T.M., 1925, **1**, 667.

3 Jezler, A., *Z. f. klin. Med.*, 1929, **111**, 48.