A NOTE ON CRYOSCOPY OF BLOOD

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While the great degree of constancy in the value of Δ for blood of the same kind is a matter of surprise on first studying the subject, it appears that occasionally the variation may be very great. This is usually a rise in osmotic pressure, as in kidney disease, where I have found $\Delta = 0.62^\circ \text{C.}$, and many higher values have been recorded, the normal value in man being 0.56°C. In cases of severe haemorrhage a lowering may be produced, 0.49°C. being the lowest in my experience, though, quoting from memory, values as low as 0.47°C. have been met with.

In this connection it may be of interest to record the values obtained with two specimens of monkey's blood which I was enabled to get from the Dublin Zoological Gardens through the kindness of Prof. A. F. Dixon—

<i>Cynocephalus babouin</i> ,	blood $\Delta = 0.615^\circ \text{C.}$
<i>Rhesus</i> ?	blood $\Delta = 0.605^\circ \text{C.}$

The blood was obtained from the hearts of the animals, which had died from colds on the previous day. Accordingly the values may not be quite normal.

One specimen of hare's blood was observed to give the very abnormal value $\Delta = 1.125^\circ \text{C.}$ This measurement was performed with the greatest care. The blood was sent to me, in a well-corked clean bottle, sent from the laboratory for the purpose, and was perfectly fresh. Hamburger¹ records $\Delta = 0.578^\circ \text{C.}$ for the whole blood and 0.580°C. for the serum. Winter² gives 0.570°C. for the serum.

Another exceptional value was given by the first in a series of samples of blood of the common fowl, $\Delta = 0.935^\circ \text{C.}$, while the mean value was $\Delta = 0.607^\circ \text{C.}$ ³ It was only after examining duck's blood, $\Delta = 0.574^\circ \text{C.}$, that the abnormality was suspected, and then many other specimens of fowl's blood were examined.

1. Hamburger, *Archiv. f. Anat. u. Phys.*; *Phys. Abt.*, S. 281, 1895.
2. Winter, *Archiv. de Physiol.*, 1895.
3. Atkins, *Proc. Roy. Dublin Soc.*, Vol. XII, N.S., March, 1909.

A large specimen of *Rhina squatina* also afforded a very puzzling value $\Delta = 0.61^\circ \text{C.}$, while the water of the bay gave $\Delta = 1.70^\circ \text{C.}$ This Elasmobranch should, according to the numerous observations of Bottazzi, C. W. Greene, W. E. Garrey and W. J. Dakin, have been practically isotonic with the sea-water. It was found on a mud flat in Cork Harbour, and the blood drawn from the heart immediately after death. The tide was falling at the time, and though the river is tidal for about ten miles higher up, it is possible that the *Rhina* lost most of its blood salts in the fresher water higher up, and was then carried down in a feeble condition and stranded.

Below are recorded a few results obtained with the blood and ovarian eggs of fishes. These do nothing more than confirm the results of W. J. Dakin,¹ and the experiments were discontinued when it was seen that the question had already been fully investigated. I am indebted to Mr. S. W. Kemp, of the Irish Fisheries Department, for most of the specimens. It was noticed that the blood was unclotted in the majority of cases, even after keeping a week in a well-corked bottle. Delezenne had previously noticed this phenomenon, and Rodier² records that coagulation is hastened by buccal mucus and peritoneal fluid to a greater degree than by tissues of the fish.

Fish	Fluid	Δ	Remarks
<i>Salmo</i>	Ovarian fluid	0.56	From fresh water
<i>Raia circularis</i>	Blood	2.095	Not clotted, S.R. 745
<i>Centrophosus squamosus</i>	Ovarian egg	2.070	Pale yellow, viscous
" "	" "	2.098	
" "	Blood "	2.125	Not clotted, S.R. 745

Station	Depth	Δ
Atlantic, off Irish coast, S.R. 745 ...	Surface ...	1.978
" " " " ...	100 fathoms ...	1.976
" " " " ...	250 fathoms ...	1.979

Fish from W. 67	Fluid	Δ	Remarks
<i>Gadus morrhua</i>	Blood	0.827	From 3 specimens, clotted
<i>Gadus virens</i>	Blood	0.858	From 1 specimen, clotted
<i>Molva molva</i>	Blood	0.747	From 1 specimen, not clotted
<i>Mustelus vulgaris</i>	Blood	2.160	From 1 specimen, not clotted
<i>Acanthias vulgaris</i>	Blood	2.100	From 7 specimens, not clotted
" " " "	Ovarian egg	2.047	Pale yellow, viscous

SEA WATER

Station	Depth	Δ
W. 67	Surface ...	1.950
" " " " " "	20 fathoms ...	1.950

1. Dakin, *Bio-Chemical Journal*, June and December, 1908.

2. Rodier, *Stat. Zool. d'Arcachon Univ. Bordeaux, Trav. des Lab.*, pp. 129-132, 1900-1901.