complete disorder in dilute solution therefore seems very appropriate.

The degree of regularity may perhaps be compared to that in a liquid metal, where each metal ion is surrounded on the average by twelve nearest neighbours arranged in close packing, but where the probability of finding any metal ion at the 'close-packed' distance from any other is high only in the case of nearest neighbours and becomes negligibly small when third or fourth nearest neighbours are considered. Thus we may conclude that despite the existence of short-range order, the hæmoglobin molecules in the red cell are suspended in true solution. This view is supported by the recent finding that the kinetics of the reaction $CO + O_2Hb \rightleftharpoons COHb + O_2$ are the same in the red cell and in cell-free solution[3].

The arguments presented above have some interesting biological implications. Clearly, from the point of view of its functional efficiency as an oxygen carrier, the red cell should combine maximum oxygen capacity with high speed of reaction and diffusion of oxygen through the cell. The greatest possible oxygen capacity would be provided by hæmoglobin crystals, which are known to have a hæmoglobin concentration of 55 per cent[4] and through which oxygen can actually diffuse. On the other hand, the speed of reaction would probably be low in an arrangement where both the position and the orientation of the molecules are fixed, and the rate of diffusion might be hampered by the narrowness of the channels between the molecules in the crystal lattice. It seems likely, therefore, that freedom of rotation of the hæmoglobin molecules and the absence of a three-dimensionally continuous lattice are needed to ensure high rates of reaction and diffusion. In that case 34 per cent is the highest concentration which is compatible with these conditions, since it leads to an average distance of approach between freely rotating molecules which is equal to their effective diameter. Any further increase in concentration would lead to mutual hindrance in the rotation of the molecules, and would be likely to affect the reaction rates.

Our calculations show that close-packing of the molecules is, in fact, an inevitable consequence of the high hæmoglobin concentration. If the molecules were arranged at random, their mean distances would have to be greater than 75 A., with the result that a hæmoglobin concentration of 34 per cent could not be achieved.

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Weight of the Rat Thymus

Recent work involved accurate weighing of the thymus glands of young (6–12 weeks old) hooded Lister rats of both sexes. It became evident that great care was essential in dissecting out the thymus because of the risk of including one or more lymph nodes in the tissue taken for weighing. In rats of this age, mediastinal lymph nodes are occasionally difficult to distinguish from part of the thymus. One or more of these nodes is usually found on each side of the thymus and is visible from the front on opening the thorax. Identification is simple when the nodes lie apart from the thymus; but when they are welded by connective tissue to the thymus, and the symmetry of the sides of this organ is not altered, confusion may arise.

Close inspection by naked eye or hand lens may be required to distinguish a node from the thymus. Typically, the surface of the node is slightly granular, being marked by the tiny bulges of many follicles. This is in contrast to the smooth, homogeneous surface of the thymus. A line of cleavage can usually be made between a node and the thymus by blunt dissection. Further, a node pressed between the blades of a pair of forceps feels harder and more 'rubbery' than the thymus. The presence of follicles, however, invariably indicates a node, and the pressure test, which would distort the tissues and interfere with subsequent microscopical examination, is not required in practice. Histological examination reveals the interloper, but only after it is too late to assess the true weight of the thymus.

The nodes can be strikingly demarcated from the thymus by vital staining. Intraperitoneal injection of 1 ml. of 0·5 per cent trypan blue (Gurr's) in distilled water every alternate day for eight days (that is, total of four injections) causes an intense staining of the nodes, whereas the thymus takes up the dye poorly. Macroscopically, the submaxillary lymph nodes are not stained so intensely as these mediastinal nodes, and the follicles of Peyer's patches of the small intestine do not appear to concentrate the dye at all. Further work is in progress on these points and on the detailed histology of the lymph nodes. In earlier work from this Institute[1] the procedure followed for stripping the thymus removed the relatively small mediastinal nodes from the weanling rats used for these experiments. But in my older rats examination of specimens of vitally stained lymph nodes adherent to the thymus indicates that the nodes could account for an error up to 30 per cent of the thymus weight if not removed.

The thymus weight of rats is often recorded in experiments besides those concerned with nutrition, and this note is published to direct attention to the possibility that such observations may be seriously complicated if great care is not taken to free the thymus from the closely related mediastinal lymph nodes.

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Brain Lactate in Emotion

There are many indications that emotional excitement is associated with increased functional activity of the central nervous system. This is shown by the increased autonomic and motor activity in emotion, as also by the shock and exhaustion which may follow intense emotion. Histologists have described changes in the staining properties of the nerve cells in emotional fatigue; but there is little information as to the nature of the underlying biochemical changes.

Lactic acid determinations were carried out on the brains of young rats. The animals were killed by