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Short Communications

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Preliminary X-ray data for horse and whale myoglobins.

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Keilin & Schmid (1948) have recently described methods of preparing large crystals of whale myoglobin. Myoglobin is a red pigment found in muscle cells and, like haemoglobin, combines reversibly with oxygen. The myoglobins are much more difficult to crystallize than the haemoglobins, and though crystallization of several species has been reported in the literature, it is only recently that single crystals large enough for X-ray analysis have become available, derived from the horse and now from the whale. Horse myoglobin has a molecular weight of only about 16,700 so it is a particularly attractive subject for X-ray study; the molecular weight of whale myoglobin has not yet been measured but may provisionally be assumed to be about the same. This note gives preliminary crystallographic data for these two proteins.

Horse (met-)myoglobin

The crystals were provided by M. W. Rees of the Department of Biochemistry at Cambridge, who prepared them by precipitation from very concentrated phosphate buffers (about 3·5 M; pH 6·4). They are monoclinic and have the space group $P2_1$. They form long needles or lath-like plates, the needle axis being b and the flat face {001}; the needle is terminated by dome faces which are of two types, {110} and {120}.

For light incident perpendicular to the flat face the crystals exhibit straight extinction, the slow ray being parallel to b; there is marked pleochroism, the electric vector also coinciding with b for maximum absorption. For light parallel to b extinction is oblique, one extinction direction approximately bisecting β ($\pm 5°$).

So far three distinct forms of the lattice have been observed, with dimensions as follows:

Lattice	Conditions	a (A.)	b (A.)	c (A.)	β (°)	Cell volume (A.^{3})
A	In 3·5 M phosphate	57·3	30·8	57·0	112	93,400
B	In sat. phosphate	57·3	30·8	43·1	98	75,500
Dry	Air-dried at room temp.	51·5	28·0	37·0	98	53,300

The unit cell contains two molecules in general positions. The 020 reflexion is very strong, and Patterson projections suggest that the molecules are flat disks, perpendicular to b and spaced $\frac{1}{2}b$ apart. Full details will be published elsewhere.

Whale (met-)myoglobin

The crystals were prepared by K. Schmid, using the second method described by Keilin & Schmid (1948), which is very similar to that used for horse myoglobin. They are orthorhombic and the space group is $P2_12_12$. They form very flattened prisms, the flat faces being {001} and the others {101}; the prisms are terminated by dome faces {210}. Photographs are given by Keilin & Schmid (1948).

There is straight extinction for light incident in all three axial directions. The crystals are strongly pleochroic, the electric vector being parallel to b for maximum absorption.

In 3 M phosphate buffer the cell dimensions are

$$a = 97{\cdot}4 \text{ A.},\quad b = 39{\cdot}8 \text{ A.},$$
$$c = 42{\cdot}5 \text{ A.},\quad \text{cell volume} = 165{,}000 \text{ A.}^3$$

Assuming the molecular weight to be similar to that of horse myoglobin, there are 4 molecules per cell in general positions.

Study of both types of crystal is continuing.

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