Bishop Wilberforce: Natural Selection and the Descent of Man

from Richard W. Wrangham

Samuel Wilberforce, Bishop of Oxford, was the man who played into T.H. Huxley's hands at the British Association's meeting in 1860. They were debating the merits of Darwinism, and the atmosphere in the crowded room was highly charged. Wilberforce was a fine speaker — "Like an olive, his nature secretes his own oil", wrote *Punch*¹ — and he ended his well-prepared attack on evolutionary theory by asking if his opponent were prepared to admit apes to his own ancestry. The reply was deadly. An ape, said Huxley, would be a preferable grandfather to an intelligent man who used his skills to bring ridicule to

science.² It won the audience and silenced the Bishop, who never spoke again on evolution.

Huxley went on to build a career out of promoting Darwinism, while Wilberforce returned to ecclesiastical matters. But how did he come to feel about evolution? His only published opinion was a review of the *Origin of Species*, written before the debate with Huxley.³ There he denied unambiguously that evolution was tenable, though he approved of natural selection. He understood the arguments well and used them to maintain that selection acted to keep species constant, not to change them⁴.

Now a clue to his subsequent feelings has emerged. The poem below was found earlier this year in his private papers, and is undated. Its theme, "degradation by natural selection", is from Richard Owen's review of the *Origin*.⁵ Wilberforce saw all too well the clash between evolutionary theory and his religious beliefs, and in 1860 he had come out in attack. But in this poem he side-stepped the conflict and retreated to comedy. It implies a man too committed to accept the evolutionary argument, yet too honest in the end to deny it. Who knows? Darwin may have had one more convert than he knew.

"Lines written on hearing that Professor Huxley had said that 'he did not care whether his grand-father was an Ape'."

Oft had I heard, but deemed the tale untrue,
That man was cousin to the Kangaroo;
That he before whose face all nature quailed,
Was but the monkey's heir, though untailed;
And that the limber Ape, whose knavish ways
And tricks fantastic oft our laughter raise,
Was just what we were in some previous state,
Ages ere Noah shipped his living freight.
But now a learn'd Professor, grave and wise,
Stoutly maintains what I supposed were lies;
And, while each listening sage in wonder gapes,
Claims a proud lineage of ancestral Apes.
Alas! cried I, if such the sage's dreams,
Save me, ye powers, from these unhallowed themes;

From self-degrading science keep me free,
And from the pride that apes humility!
But O should fate bring back these dreams accursed,
And shuddering Nature find her laws reversed;
Should this, the age of wonders, see again
Men sunk to monkeys, monkeys raised to men:
Be mine the lot, on some far-distant shore,
Where Science wearies not nor savants bore —
Where no learn'd Apes our fallen race may scorn,
Nor point the moral which our tails adorn —
To shun the sight of metamorphosed friends,
Till time again shall shape their altered ends,
To soothe each fond regret, howe'er I can;
And, at the least, to dream myself a Man!

S. Wilberforce

1. Anon *Punch* 25, 206 (1853).

2. Foskett, D.J. *Nature* 172, 920 (1953).

3. Wilberforce, S. *Quarterly Review* 180 (215), 225 (1860).

4. Wrangham, R.W. *New Scientist* 83 (1167), 450 (1979).

5. Owen, R. *Edinburgh Review* 111 (226), 487 (1860).

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have properties that are readily observed *in vitro* and are clearly distinct from those of the unphosphorylated protein. The influence of phosphorylation on the potentiation of the actin-activated myosin MgATPase has been the major focus of attention. Upon phosphorylation of the myosin light chain, the MgATPase activity of the protein in the presence of actin is increased ten- to twentyfold¹².

A third manifestation of the effect of myosin phosphorylation has now been observed *in vitro* with myosin from smooth muscle and nonmuscle cells. Working with myosins from thymus, platelets and gizzard, John Kendrick-Jones *et al.* show in this issue of *Nature* (p.233) that bipolar thick filaments are formed under physiological conditions only if the myosins are phosphorylated. These synthetic thick filaments are stable in the presence of millimolar concentrations of MgATP. Shorter filaments are formed of un-

phosphorylated myosins *in vitro* at low ionic strength, but these are completely dissociated well below physiological concentrations of MgATP. These results are a striking extension and confirmation of the work by Hiroshi Suzuki and his collaborators at the Tokyo Institute of Technology¹³ who first observed that the state of gizzard myosin phosphorylation has a profound effect upon the ability of the protein to form extended aggregates.

The observations of Suzuki and of Kendrick-Jones are particularly important because they resolve some puzzles and raise some interesting questions. If smooth muscle and non-muscle myosin must be phosphorylated in order to form thick filaments *in vivo*, then the absence of such filaments in many electron micrographs of smooth muscle and nonmuscle cells might be explained by the absence of phosphorylated myosin. Furthermore, another possible function of phosphorylation in

striated muscle becomes clear — phosphorylated, striated muscle myosin may constitute thick filaments more stable and/or more ordered than the unphosphorylated myosin.

The questions are intriguing. How does filament formation contribute to the observed actin-activation of the smooth muscle and nonmuscle MgATPase? Is actin-activation due to an increased order in the myosin array and, therefore, to an increased accessibility of myosin to actin? Another very important question raised by Kendrick-Jones has to do with how modification of the head portion of myosin might influence the association and packing of the opposite, tail portion of the molecule. No doubt subsequent studies by these and other investigators will address these problems and will shed even more light upon the nature of the finely tuned control in the contractile protein complex.

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