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## Double-duplication evolution

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In the 1 September *Science* Lang *et al.* argue that two single-domain biosynthetic enzymes appear to have evolved from gene duplication, followed by fusion, followed by a second gene duplication (*Science* 2000, **289**:1546-1550). Both of the proteins, HisA and HisF, can be broken down into two half *beta/alpha barrels*. The four half barrels can be superimposed on each other, revealing 22% identical or similar residues. As both enzymes bind biphosphate substrates, each half barrel has a phosphate-binding motif, and HisF even exhibits limited HisA catalytic activity. Lang *et al.* propose that an ancestral protein motif was duplicated and fused to produce the HisA isomerase enzyme, before a second duplication and further evolution yielded the more complex HisF synthase activity.

## References

1. Science magazine, [<http://www.sciencemag.org/>]
2. Three-dimensional profiles from residue-pair preferences: identification of sequences with beta/alpha-barrel fold.