Hot off the press

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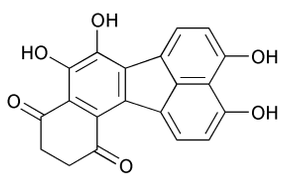
The ring structure of hortein **1**, a metabolite of the fungus *Hortaea werneckii* associated with the sponge *Aplysinia aerophoba*, is new to natural products (P. Protsch and co-workers, *J. Nat. Prod.*, 2001, *64*, 651). Hortein **1** also contains the unusual tetrahydronaphthoquinone moiety. The tetracyclic iridoid macrophyllide **2** has been found in leaves of *Rothmannia macrophylla* (I. Kouno and co-workers, *J. Nat. Prod.*, 2001, *64*, 796). Phorbasin B **3**, from a *Phorbas* species, has a novel diterpenoid skeleton (M. McNally and R. J. Capon, *J. Nat. Prod.*, 2001, *64*, 645). Cordypyridone A **4** from the insect pathogenic fungus *Cordyceps nipponica* shows potent antimalarial activity (M. Isaka and M. Tanticharoen, *J. Org. Chem.*, 2001, *66*, 4803).



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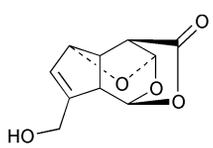

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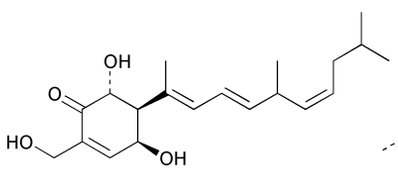

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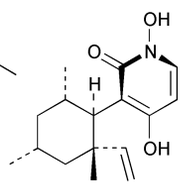

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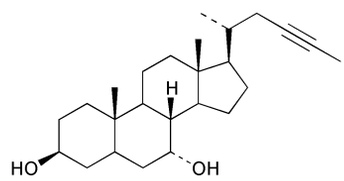
Several acetylenic sterols, including the dinorcholestane gelliusterol A **5**, have been isolated from an unidentified sponge *Gellius* species (P. J. Scheuer and co-workers, *J. Nat. Prod.*, 2001, *64*, 741). The symmetrical bisacetylene derivative **6** is a metabolite of the cyanobacterium *Microcoleus lyngbyaceus* (K. L. Erickson and co-workers, *J. Nat. Prod.*, 2001, *64*, 572). The symbiotic Actinomycete *Frankia* is a source of frankiamide **7** which contains an orthoamide and an imide (K. Pihlaja and co-workers, *J. Org. Chem.*, 2001, *66*, 4065). Artocarpol F **8**, isolated from the root bark of *Artocarpus rigida*, has a novel skeleton including an oxepine ring (C.-N. Lin and co-workers, *Tetrahedron Lett.*, 2001, *42*, 5269).

Voastrictine **9** is a pentacyclic quinoline alkaloid with a novel skeleton from *Tabernaemontana corymbosa* (T.-S. Kam *et al.*, *Tetrahedron Lett.*, 2001, *42*, 4721). The pyrido[1,2-*c*][1,3]-oxazine alkaloid hyperaspine **10** has been obtained from the ladybird beetle *Hyperaspis campestris* (B. Lebrun *et al.*, *Tetrahedron Lett.*, 2001, *42*, 4621). Hydrarchine A **11**, from roots of *Hydrangea chinensis*, is a new structural type (Y.-C. Wu and co-workers, *J. Nat. Prod.*, 2001, *64*, 948). The C_2 symmetric bromotyrosine derivative zamamistatin **12** from the Okinawan sponge *Pseudoceratina purpurea* shows antibacterial properties (D. Uemura and co-workers, *Tetrahedron Lett.*, 2001, *42*, 5265).

The green macro-alga *Caulerpa taxifolia* rapidly transforms its major metabolite caulerpenyne **13** into the dialdehyde **14** when wounded (V. Jung and G. Phnert, *Tetrahedron*, 2001, *57*, 7169). A method of determining whether a terpenoid is derived from the mevalonic acid pathway or the 5-deoxy-D-xylulose



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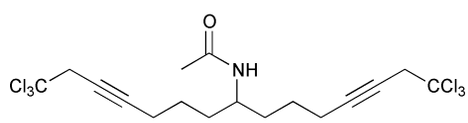

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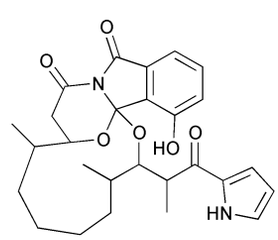

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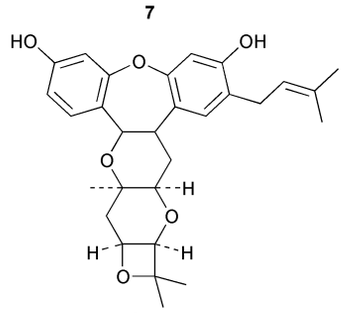

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pathway has been proposed by W. Boland and co-workers (*Angew. Chem., Int. Ed.*, 2001, *40*, 2091). By observing natural ^{12}C : ^{13}C isotope ratios the group proposes that there is a significant difference in isotope ratios between the two pathways. This difference arises from isotope effects in the reactions concerned. The cleavage of β-carotene **15** to produce retinal **16** was previously thought to be catalysed by a dioxygenase, however labelling studies have now shown that a monooxygenase pathway is involved, possibly *via* an epoxide intermediate (W.-D. Woggon and co-workers, *Angew. Chem., Int. Ed.*, 2001, *40*, 2614). The role of complex formation between different protein components in regulating various aspects of catalysis by methane monoxygenases has been reviewed by S. J. Lippard *et al.* (*Angew. Chem., Int. Ed.*, 2001, *40*, 2782). Dioxygen activation and substrate hydroxylation are also dicussed.

Polyoxypeptin A is a hexadepsiptide from a *Streptomyces* species that contains the novel amino acid 3-hydroxy-3-methylproline **17**. Incorporation studies have demonstrated that this amino acid is derived from isoleucine **18** (K. Umezawa *et al.*,

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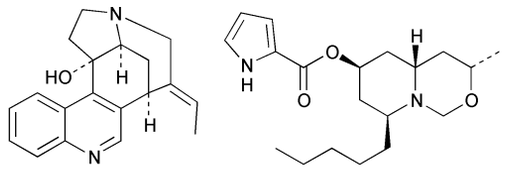

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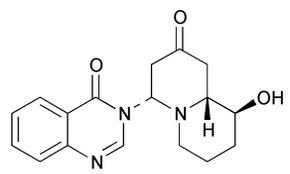

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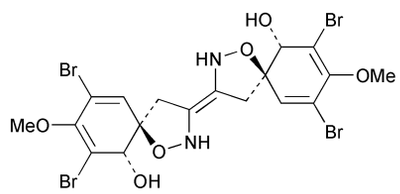

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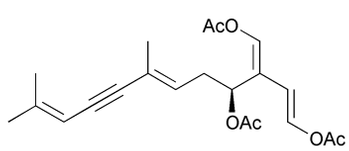

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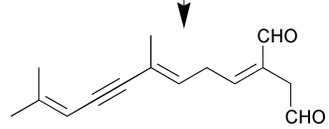

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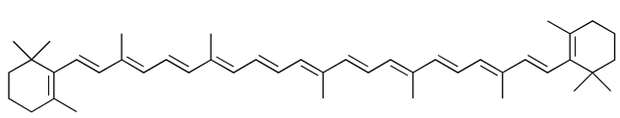

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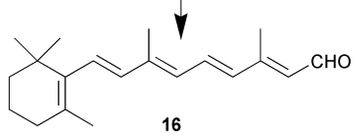

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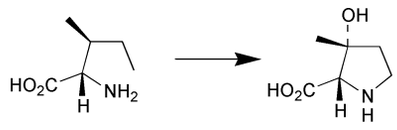
J. Chem. Soc., Perkin Trans. 1, 2001, 1550). Labelling studies have shown that 3-hydroxy-3-methylproline **17** is also involved in the biosynthesis of paraherquamide A **19**, a metabolite of *Penicillium fellutanum* (R. B. Williams and co-workers, *Tetrahedron*, 2001, *57*, 5303). Incorporation studies with labelled precursors using *Streptomyces hygroscopicus* var. *limoneus*, which produces validamycin A, have indicated that dehydration of 5-*epi*-valiolone **20** to valienone **21** occurs by a *syn* elimination of water (T. Mahmud *et al.*, *J. Org. Chem.*, 2001, *66*, 5066). The biosynthesis of chalciporone **22**, a metabolite of the mushroom *Chalciporus piperatus*, has been studied using labelled acetate and alanine (W. Steglich and co-workers, *J. Am. Chem. Soc.*, 2001, *123*, 4837). The results indicate that chalciporone **22** is formed from alanine and seven acetate units with loss of the carboxy group of alanine.

In the formation of 2-ethylhexanoic acid, P450cam shows a preference for the (*R*)-enantiomer of 2-ethylhexanol. Crystallo-



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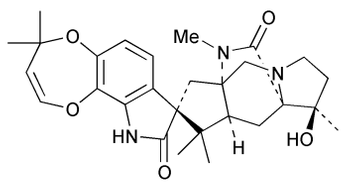

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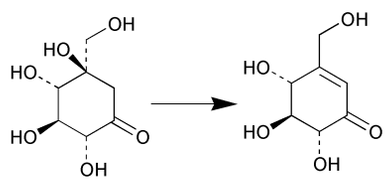

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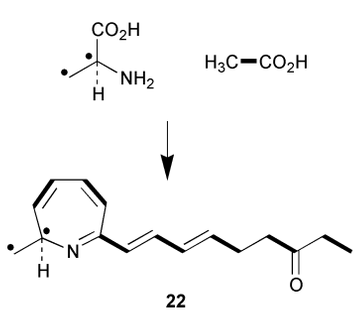

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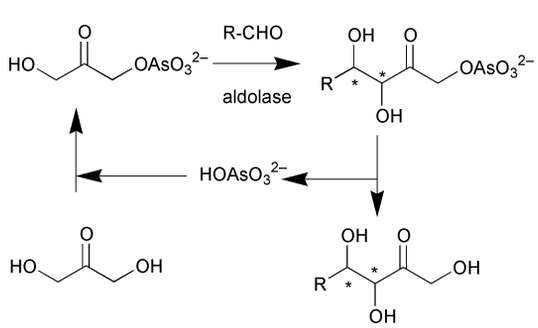
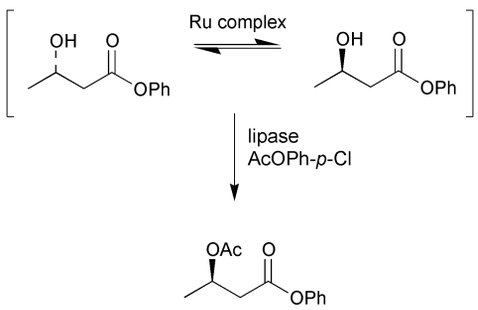
graphic and enzymatic studies indicate that the (*R*)-enantiomer binds in a more ordered-state. The stereoselectivity displayed by P450cam may therefore provide a platform for rational drug design (K. J. French, *Biochemistry*, 2001, *40*, 9532). Aldol reactions of *in situ* formed 3-hydroxy-2-oxopropyl arsenate with different aldehydes were catalysed by bacterial D-fructose-1,6-bisphospate aldolase (FruA) with arsenate acting as a phosphate mimic (Scheme 1) (R. A. Sheldon and co-workers, *J. Org. Chem.*, 2001, *66*, 4559). The authors describe the influence of the arsenate on the stereoselectivity of the aldol reaction. A range of unnatural aldehyde acceptor substrates could be solubilised using cosolvents that also increased the reaction rate and enhanced the stability of FruA.



Scheme 1

U. T. Bornscheuer and co-workers have reported the over expression of pig liver esterase (PLE) (*Angew. Chem., Int. Ed.*, 2001, *40*, 2851). The recombinant PLE is able to catalyse the conversion of compounds to high enantiomeric excess, that were previously inaccessible to PLE. A lipase/ruthenium catalysed dynamic kinetic resolution of hydroxy acids, diols and hydroxy aldehydes protected with a bulky group as the steric

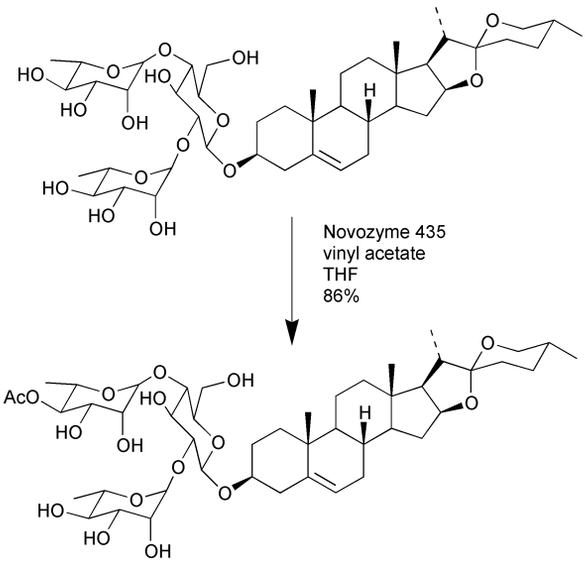
auxiliary (for example, Scheme 2) has been achieved with high enantiomeric excess and yields (M. J. Kim and co-workers, *J. Org. Chem.*, 2001, *66*, 4736). The enantioselectivity of lipase B from *Candida antarctica* (CALB) was selectively altered in organic media using either a range of organic-soluble bases or solid-state buffers of known pK_a (Quirós and co-workers, *J. Org. Chem.*, 2001, *66*, 5074). The improved technique increased the enantioselectivity of CALB from 50% ee to greater than 96% ee using either Et_3N or the appropriate solid-state buffer. Diosgenyl saponins were regioselectively acylated using *Candida antarctica* lipase B with vinyl esters as acylating agents in THF to afford the corresponding mono- or di-acyldiosgenyl saponins (Scheme 3) (B. Yu *et al.*, *Tetrahedron Lett.*, 2001, *42*, 5513).



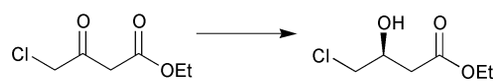
Scheme 2

The enantioselective reduction of alkyl 3-oxobutanoate (Scheme 4) by carbonyl reductase S1 from *Candida magnoliae* has been investigated (Y. Yasohara *et al.*, *Tetrahedron: Asymmetry*, 2001, *12*, 1713). Carbonyl reductase reduced alkyl 4-halo-3-oxobutanoates to the corresponding optically pure (*S*)-3-hydroxy esters. The use of protein crystals as novel catalytic materials has been reviewed by A. L. Margolin and M. A. Navia (*Angew. Chem., Int. Ed.*, 2001, *40*, 2204). Their applications either as protein crystals or cross-linked for mechanical strength in areas such as industrial catalysis, bioremediation, enantioselective chromatography and protein therapeutics is reviewed.

S. Tabata and co-workers have found evidence that the two



Scheme 3



Scheme 4

activities of the eukaryotic glycogen debranching enzyme, transferase and glucosidase are independent and located at different sites on the polypetide chain (*J. Biol. Chem.*, 2001, *276*, 28824). Catalytic reactions of DNA polymerase were monitored directly using a quartz crystal microbalance. Binding of the DNA polymerase, elongation of complementary nucleotides along the template and release of the enzyme could be detected continuously (Y. Okahata *et al.*, *Chem. Eur J.*, 2001, *7*, 3305). Using Raman spectroscopy to screen compounds in drug design is reported by P. R. Carey and co-workers (*Biochemistry*, 2001, *40*, 9751). Raman spectra were obtained for a series of five inhibitors bound individually to the active site of human urokinase obtained *in situ* from urokinase single crystals in hanging drops by using a Raman microscope.