7. Frost L, Vestergaard P. Caffeine and risk of atrial fibrillation or flutter: the Danish Diet, Cancer, and Health Study. *Am J Clin Nutr* 2005; **81:** 578–82.
8. Luo M, *et al.* Inhibition of LDL oxidation by green tea extract. *Lancet* 1997; **349:** 360–1.
9. Geleijnse JM, *et al.* Tea flavonoids may protect against atherosclerosis: the Rotterdam study. *Arch Intern Med* 1999; **159:** 2170–4.

Effects on the muscles. Severe myositis in an elderly man who drank around 14 litres of tea daily was attributed to hypokalaemia produced by the xanthine content of the beverage.[1] The patient improved after intravenous potassium replacement and subsequently remained well with a reduction in tea intake.

1. Trewby PN, *et al.* Teapot myositis. *Lancet* 1998; **351:** 1248.

Malignant neoplasms. A review of available data did not suggest a clinically significant association between the regular use of coffee and the development of cancer of the lower urinary tract in men or women.[1]

1. Viscoli CM, *et al.* Bladder cancer and coffee drinking: a summary of case-control research. *Lancet* 1993; **341:** 1432–7.

Interactions

The possibility of synergistic effects in patients receiving xanthines who consume large amounts of xanthine-containing beverages should be borne in mind.

Antipsychotics. Xanthine-containing beverages have been reported to precipitate some antipsychotic drugs from solution *in vitro*, but do not appear to alter antipsychotic concentrations *in vivo*. For references, see p.975.

Uses and Administration

Xanthine-containing beverages including chocolate, coffee, cocoa, cola, maté, and tea are widely consumed and have a mild stimulant effect on the CNS. The primary xanthine constituent is caffeine (p.1116) but other xanthine derivatives such as theobromine (p.1140) and theophylline (p.1140) may also be present; cocoa and chocolate contain significant amounts of theobromine.

Coffee is the kernel of the dried ripe seeds of *Coffea arabica*, *C. liberica*, *C. canephora* (robusta coffee), and other species of *Coffea* (Rubiaceae), roasted until it acquires a deep brown colour and a pleasant characteristic aroma. It contains about 1 to 2% of caffeine. Coffee has been used in the form of an infusion or decoction as a stimulant and as a flavour in some pharmaceutical preparations. A decoction is used as a beverage containing up to about 100 mg of caffeine per 100 mL. Preparations of instant coffee may contain up to 40% less caffeine while decaffeinated preparations may contain only up to about 3 mg per 100 mL.

Kola (cola, cola seeds, kola nuts) is the dried cotyledons of *Cola nitida* and *C. acuminata* (Sterculiaceae), containing up to about 2.5% of caffeine and traces of theobromine. Kola is used in the preparation of cola drinks which may contain up to 20 mg of caffeine per 100 mL.

Maté (Paraguay Tea) is the dried leaves of *Ilex paraguensis* (Aquifoliaceae), containing 0.2 to 2% of caffeine and traces of theobromine. Maté is less astringent than tea and is extensively used as a beverage in South America.

Tea (thea, chá, thé, tee) is the prepared young leaves and leafbuds of *Camellia sinensis* (=*C. thea*) (Theaceae). It contains 1 to 5% of caffeine, up to 24% of tannin, and small amounts of theobromine and theophylline. Tea is used in an infusion as a beverage containing up to about 60 mg of caffeine per 100 mL.

Guarana consists of the crushed seeds of *Paullinia cupana* var *sorbilis* (Sapindaceae). Caffeine appears to be its major active ingredient which was once termed guaranine. Herbal preparations include a beverage or liquid extract and may contain 5% caffeine.

Homoeopathy. Coffee has been used in homoeopathic medicines under the following names: Coffea arabica; Coffea; Coffea cruda; Coff. cr.

Kola has been used in homoeopathic medicines under the following names: Cola.

Maté has been used in homoeopathic medicines under the following names: Ilex paraguayensis; Ile. para.

Guarana has been used in homoeopathic medicines.

Diabetes mellitus. Regular coffee consumption has been reported[1-6] to reduce the risk of developing type 2 diabetes mellitus, although it is not clear whether this effect is due to caffeine or some other constituent in coffee.

1. Salazar-Martinez E, *et al.* Coffee consumption and risk for type 2 diabetes mellitus. *Ann Intern Med* 2004; **140:** 1–8.
2. van Dam RM, Hu FB. Coffee consumption and risk of type 2 diabetes: a systematic review. *JAMA* 2005; **294:** 97–104.
3. van Dam RM, *et al.* Coffee, caffeine, and risk of type 2 diabetes: a prospective cohort study in younger and middle-aged U.S. women. *Diabetes Care* 2006; **29:** 398–403.
4. Iso H, *et al.* The relationship between green tea and total caffeine intake and risk for self-reported type 2 diabetes among Japanese adults. *Ann Intern Med* 2006; **144:** 554–62.
5. Pereira MA, *et al.* Coffee consumption and risk of type 2 diabetes mellitus: an 11-year prospective study of 28 812 postmenopausal women. *Arch Intern Med* 2006; **166:** 1311–16.
6. Smith B, *et al.* Does coffee consumption reduce the risk of type 2 diabetes in individuals with impaired glucose? *Diabetes Care* 2006; **29:** 2385–90.

Preparations

Proprietary Preparations (details are given in Part 3)
Arg.: Radite; ***Braz.:*** Guarafort; ***Fr.:*** Camiline; ***Ger.:*** Carbo Konigsfeld; ***Ital.:*** Categ; ***UK:*** Yariba; ***USA:*** Tegreen.

Multi-ingredient: ***Arg.:*** Centella Incaico; Energy Plus; Ginkgo Biloba Memo Diates; Guarana Diates; Ilx Gel Reductor; Yerba Diet; ***Austral.:*** Avena Complex; Bioglan 3B Beer Belly Buster; Infant Tonic†; Irontona; Vig; Vig Recovery†; Vig†; Vitanox; Vitatona; ***Braz.:*** Astenol†; Derm'attive 10†; Gastrogenol†; Kola Fosfatada Soel†; ***Canad.:*** Biotrim†; Energy Plus†; ***Cz.:*** Abfuhr-Heilkrautertee†; ***Fr.:*** Biotone†; Drainuryl; Filigel; Maxidraine†; Mincifit; Prominci†; Quintonine; Tealine†; Tonactil†; Uromil; YSE; ***Ger.:*** Cardibisana†; Myrrhinil-Intest; Nieroxin N†; Ramend Krauter†; ***Hong Kong:*** LEAN Formula w/ Advantra†; Wari-Procomil; ***Indon.:*** F-Slim; Lycoq; ***Irl.:*** Biofreeze; ***Ital.:*** Altadrine; Biomineral 5-Alfa Shampoo; Calmason; Chinoidina†; Dam; Four-Ton; Ginkoba Active; Memorandum; Snell Cell; ***Mex.:*** Noxivid; ***Philipp.:*** Fitrum; Jamieson Total Energy; Memory DD; Nutrafit; ***Pol.:*** Cardiol C; Penigra; Tobacoff; ***Port.:*** Lipoforte†; ***Rus.:*** Insti (Инсти); ***Spain:*** Exodren; Fitosvelt†; Rimagrip; Vigortonic; ***Thai.:*** Wari-Procomil†; ***UK:*** Biofreeze; Chlorophyll; Cleansing Herbs; Daily Fatigue Relief; Damiana and Kola Tablets; Glykola; Labiton†; Lion Cleansing Herbs; S.P.H.P; Strength; Zotrim; ***Venez.:*** Demerung; Eufytose†.

Xanthopterin

2-Amino-4,6-dihydroxypteridine.
$C_6H_5N_5O_2$ = 179.1.
CAS — 119-44-8.

Profile

Xanthopterin is a natural pigment that has been used in the management of eye disorders.

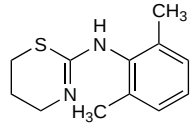
Preparations

Proprietary Preparations (details are given in Part 3)
Multi-ingredient: ***Ital.:*** Xantervit; Xantervit Antibiotico; Xantervit Eparina.

Xylazine *(BAN, rINN)*

Ksylatsiini; Xilazina; Xylazin; Xylazinum. *N*-(5,6-Dihydro-4*H*-1,3-thiazin-2-yl)-2,6-xylidine.

Ксилазин
$C_{12}H_{16}N_2S$ = 220.3.
CAS — 7361-61-7.
ATC Vet — QN05CM92.



Pharmacopoeias. In *US*.
USP 31 (Xylazine). Colourless to white crystals. Sparingly soluble in acetone, in chloroform, and in dilute acid; insoluble in dilute alkali. Store in airtight containers at a temperature of 25°, excursions permitted between 15° and 30°.

Xylazine Hydrochloride *(BANM, USAN, rINNM)*

Bay-Va-1470; Hidrocloruro de xilazina; Ksylatsiinihydrokloridi; Xilazin-hidroklorid; Xylazine, chlorhydrate de; Xylazin-hydrochlorid; Xylazinhydroklorid; Xylazini hydrochloridum.

Ксилазина Гидрохлорид
$C_{12}H_{16}N_2S$, HCl = 256.8.
CAS — 23076-35-9.

Pharmacopoeias. In *US*.
Eur. (see p.vii) includes for veterinary use only.
Ph. Eur. 6.2 (Xylazine Hydrochloride for Veterinary Use; Xylazine Hydrochloride BP(Vet) 2008). A white or almost white, crystalline, hygroscopic powder. Freely soluble in water and in dichloromethane; very soluble in methyl alcohol. A 10% solution in water has a pH of 4.0 to 5.5. Store in airtight containers. Protect from light.
USP 31 (Xylazine Hydrochloride). Colourless to white crystals. Sparingly soluble in acetone, in methyl alcohol, and in dilute acid; insoluble in dilute alkali. A 1% solution in water has a pH of 4.0 to 6.0. Store in airtight containers at a temperature of 25°, excursions permitted between 15° and 30°.

Profile

Xylazine is a sedative, analgesic, and muscle relaxant used in veterinary medicine. The hydrochloride is used similarly. Abuse has been reported.

Adverse effects. Reports[1-5] of toxicity and abuse associated with xylazine. Bradycardia, hypotension, and coma were associated with the self-administration of 200 mg of xylazine. Treatment was supportive.[1]

1. Samanta A, *et al.* Accidental self administration of xylazine in a veterinary nurse. *Postgrad Med J* 1990; **66:** 244–5.
2. Mittleman RE, *et al.* Xylazine toxicity—literature review and report of two cases. *J Forensic Sci* 1998; **43:** 400–2.
3. Hoffmann U, *et al.* Severe intoxication with the veterinary tranquilizer xylazine in humans. *J Anal Toxicol* 2001; **25:** 245–9.
4. Capraro AJ, *et al.* Severe intoxication from xylazine inhalation. *Pediatr Emerg Care* 2001; **17:** 447–8.
5. Elejalde JI, *et al.* Drug abuse with inhalated xylazine. *Eur J Emerg Med* 2003; **10:** 252–3.

Xylose

Ksilozė; Ksyloosi; Ksyloza; Wood Sugar; Xilosa; Xilóz; Xylos; Xylosa; D-Xylose; Xylosum. α-D-Xylopyranose.
$C_5H_{10}O_5$ = 150.1.
CAS — 58-86-6; 6763-34-4.

Pharmacopoeias. In *Eur.* (see p.vii) and *US*.
Ph. Eur. 6.2 (Xylose). A white or almost white crystalline powder or colourless needles. Freely soluble in water; soluble in hot alcohol.
USP 31 (Xylose). Odourless, colourless needles or white crystalline powder. Very soluble in water; slightly soluble in alcohol. Store in airtight containers at a temperature of 15° to 30°.

Profile

Xylose has been used for the investigation of absorption from the gastrointestinal tract. In the absence of malabsorption, about 35% of a 5-g oral dose and about 25% of a 25-g oral dose are reported to be excreted in the urine within 5 hours. It has been given by mouth, usually in a dose of either 5 or 25 g, with up to 700 mL of water. The amount recovered in the urine is estimated and used to assess any malabsorption. Adjustment may have to be made for renal impairment. Xylose may cause some gastrointestinal discomfort with large doses. Other drugs may affect the absorption of xylose and interfere with the xylose test.

The test has been adapted to use blood-xylose concentrations.

◊ References.

1. Craig RM, Ehrenpreis ED. D-xylose testing. *J Clin Gastroenterol* 1999; **29:** 143–50.

Precautions. Preparations that contain, or are metabolised to, xylose may interfere with the results from glucose tests (p.2314). Overestimation of glucose results may mask hypoglycaemia, resulting in the inappropriate use of insulin.[1,2]

1. Medicines and Healthcare products Regulatory Agency. Medical device alert: ref MDA/2007/058 issued 19 July 2007. Available at: http://www.mhra.gov.uk/PrintPreview/PublicationSP/CON2031807 (accessed 01/07/08)
2. FDA. Important safety information on interference with blood glucose measurement following use of parenteral maltose/parenteral galactose/oral xylose-containing products (issued November 2005). Available at: http://www.fda.gov/cber/safety/maltose110405.htm (accessed 01/07/08)

Yellow Dock

Curly Dock; Lengua de vaca; Sour Dock.

NOTE. The name sour dock has also been used for sorrel (p.2391).

Profile

Yellow dock, the root of *Rumex crispus* (Polygonaceae) has laxative and choleretic properties. It is used for constipation, jaundice, and chronic skin disorders.

Homoeopathy. Yellow Dock has been used in homoeopathic medicines under the following names: Rumex; Rumex crispus; Rumex c.

Preparations

Proprietary Preparations (details are given in Part 3)
Multi-ingredient: ***Austral.:*** Colax; Dermaco; Haemo-Red Formula; Herbal Cleanse†; Trifolium Complex†; ***Canad.:*** Herborex; ***UK:*** Skin Eruptions Mixture.

Ylang Ylang

Cananga; Ylang-ylang.

Profile

The flowers of ylang ylang (*Cananga odorata*, Annonoceae) are the source of ylang ylang oil. Ylang ylang oil is used in perfumery, as a flavouring agent, and in aromatherapy.

Preparations

Proprietary Preparations (details are given in Part 3)
Multi-ingredient: ***UK:*** Teenstick.

Yucca

Yuca.

Profile

Various species of *Yucca* (Liliaceae), including Mohave yucca (*Y. schidigera*; *Y. mohavensis*), the Joshua tree (*Y. brevifolia*; *Y. arborescens*), and bear grass (*Y. filamentosa*) have been used in herbal medicine and as foods.

Preparations

Proprietary Preparations (details are given in Part 3)
Multi-ingredient: ***Austral.:*** Prost-1†; ***Braz.:*** Bronquiogem.

Zanthoxylum Fruit

Prickly Ash Berries; Zanthoxylum, fruto de.

Pharmacopoeias. In *Chin.* and *Jpn*.

Profile
Zanthoxylum fruit is the pericarp of the ripe fruit of *Zanthoxylum piperitum* (*Xanthoxylum piperitum*) (Rutaceae) or other species of *Zanthoxylum*. It contains about 3.3% v/w of essential oil.

Zanthoxylum (BPC 1934) (Toothache Bark; Xanthoxylum) is the dried bark of the northern prickly ash, *Z. americanum*, or the southern prickly ash, *Z. clavaherculis*. Both varieties contain a complex mixture of components, including benzophenanthridine alkaloids; northern prickly ash also contains coumarins.

Zanthoxylum fruit has carminative properties and has been used for rheumatic disorders. Zanthoxylum bark has been used similarly, but there is some concern about the potential toxicity of the benzophenanthridine alkaloids which it contains, and some authorities consider that it should not be recommended.

Preparations
Proprietary Preparations (details are given in Part 3)

Multi-ingredient: ***Austral.:*** For Peripheral Circulation Herbal Plus Formula 5; Lifesystem Herbal Formula 6 For Peripheral Circulation†; Uva-Ursi Plus†; ***Fr.:*** Node K; Phytheol; ***UK:*** Daily Overwork & Mental Fatigue Relief; Peerless Composition Essence; Tabritis.

Zein

Zeína.

CAS — 9010-66-6 (zeins).

Pharmacopoeias. In *Chin.* Also in *USNF*.
USNF 26 (Zein). A prolamine derived from corn, *Zea mays* (Gramineae). A white to yellow powder. Insoluble in water and in acetone; readily soluble in acetone-water mixtures between the limits of 60% and 80% of acetone by volume; soluble in aqueous alcohols, in ethoxyethanol; in glycols, in furfuryl alcohol, in tetrahydrofurfuryl alcohol, and in aqueous alkaline solutions of pH 11.5 and above; insoluble in all anhydrous alcohols except methyl alcohol. Store in airtight containers.

Profile
Zein is used as a tablet binder and coating agent for pharmaceutical preparations and foodstuffs. It has been used as a substitute for shellac.

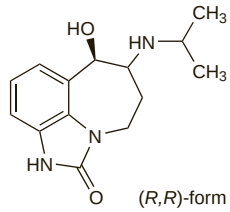
Zilpaterol Hydrochloride *(rINNM)* ⊗

Hidrocloruro de zilpaterol; RU-42173 (base or hydrochloride); Zilpatérol, Chlorhydrate de; Zilpateroli Hydrochloridum. (±)-*trans*-4,5,6,7-Tetrahydro-7-hydroxy-6-(isopropylamino)imidazo-[4,5,1-*jk*][1]benzazepin-2(1*H*)-one hydrochloride.

Зилпатерола Гидрохлорид

$C_{14}H_{19}N_3O_2$,HCl = 297.8.

CAS — 117827-79-9 (zilpaterol); 119520-05-7 (zilpaterol); 119520-06-8 (zilpaterol hydrochloride);.



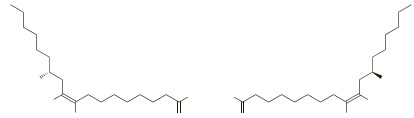
(zilpaterol)

Profile
Zilpaterol hydrochloride is a beta$_2$-agonist. It is employed in the USA and some other countries as an animal-feed additive to promote weight gain but such use is not permitted in the EU. It has anabolic properties and may be subject to abuse in sport.

Zinc Ricinoleate

Рицинолеат Цинка

$(C_{18}H_{33}O_3)_2Zn$ = 660.3.
CAS — 13040-19-2.



Profile
Zinc ricinoleate is used in preparations to combat body odour including underarm, colostomy, and ileostomy deodorant products. It is also used as a deodoriser in laundry products.

Preparations
Proprietary Preparations (details are given in Part 3)
Ital.: Antio.

Multi-ingredient: ***Austral.:*** Banish II.

Zirconium

Circonio; Zirconio; Zirkonium.
Zr = 91.224.
CAS — 7440-67-7 (zirconium); 1314-23-4 (zirconium dioxide); 60676-90-6 (zirconium lactate); 7699-43-6 (zirconium oxychloride);.

Profile
Zirconium and its compounds e.g. zirconium dioxide, zirconium lactate, and zirconium oxychloride, have been used in deodorant preparations; the dioxide is also used in dentistry. There have been reports of hypersensitivity reactions with granulomas. Zirconium dioxide has also been used as a contrast medium.

Adverse effects. A report[1] of pulmonary fibrosis associated with inhalation of a polishing agent containing mainly zirconium dioxide with quartz.

1. Bartter T, *et al.* Zirconium compound-induced pulmonary fibrosis. *Arch Intern Med* 1991; **151:** 1197–1201.