

2. Murphy LA, White IR. Contact dermatitis from geraniol in washing-up liquid. *Contact Dermatitis* 2003; **49**: 52.  
3. Tamagawa-Mineoka R, et al. Allergic contact cheilitis due to geraniol in food. *Contact Dermatitis* 2007; **56**: 242–3.

### Preparations

**Proprietary Preparations** (details are given in Part 3)  
**USA:** Cholestin.

**Multi-ingredient:** **Canad.:** Natrapel; **Fr.:** Biolar; Moustidose.

### Geranium Oil

Aetheroleum Pelargonii; Geranii Etheroleum; Geranio, aceite esencial de; Geraniová silice; Oleum Geranii; Pelargonium Oil; Rose Geranium Oil.

Гераниевое Масло

### Profile

Geranium oil is a volatile oil obtained by distillation from the aerial parts of various species and hybrid forms of *Pelargonium* (Geraniaceae). It contains geraniol (p.2310). It is used to perfume various preparations and has been included in insect repellent preparations. It is also used in aromatherapy.

**Adverse effects.** Allergic reactions have been reported<sup>1</sup> with herbal preparations containing extracts of *Pelargonium sidoides* and *P. reniforme* used for respiratory-tract infections.

1. de Boer HJ, et al. Allergic reactions to medicines derived from *Pelargonium* species. *Drug Safety* 2007; **30**: 677–80.

**Postherpetic neuralgia.** A study<sup>1</sup> involving 30 patients has indicated that topically applied geranium oil is of benefit in the management of the pain of postherpetic neuralgia. Pain relief was obtained within a few minutes but further study is required to determine the duration of effect beyond 1 hour. Adverse effects were considered to be minor and included burning in the eye, skin rash, and lightheadedness.

1. Greenway FL, et al. Temporary relief of postherpetic neuralgia pain with topical geranium oil. *Am J Med* 2003; **115**: 586–7.

### Preparations

**Proprietary Preparations** (details are given in Part 3)  
**Braz.:** Kaloba; Umckant; **Ger.:** Umckaloabo; **Ital.:** Entom Nature; **Mex.:** Umckaloabo; **Rus.:** Umckalor (Умкчалор); **UK:** Kaloba; **Venez.:** Kaloba.

**Multi-ingredient:** **Fr.:** Acaridif; Sedermyl Actifroid; **Ger.:** Rosatum Heilsalbe; **Ital.:** Air Citronella; Dentosan Azione Intensiva; Dentosan Mese; Mistick Verde; Otosan Natural Ear Drops; **NZ:** Mr Nits; **UK:** Medicated Extract of Rosemary; Nostroline; Teenstick.

### Germanium

Germanio.

Ge = 72.64.

CAS — 7440-56-4.

### Profile

Germanium compounds have been used in dietary supplements promoted for conditions including cancer, chronic fatigue syndrome, and immunodeficiency disorders. However, germanium compounds can produce severe renal damage and their use should be discouraged.

Germanium has also been used in dental alloys and has various industrial uses.

**Effects on the kidneys.** In the UK the DOH has recommended that germanium should not be taken as a dietary supplement because of a significant incidence of renal toxicity. There have been a number of reports of severe renal damage, including fatalities, resulting from germanium ingestion.

### References

1. Okada K, et al. Renal failure caused by long-term use of a germanium preparation as an elixir. *Clin Neurol* 1989; **31**: 219–24.  
2. van der Spoel JJ, et al. Dangers of dietary germanium supplements. *Lancet* 1990; **336**: 117. Correction. *ibid.* 1991; **337**: 864.  
3. Schauss AG. Nephrotoxicity in humans by the ultratrace element germanium. *Ren Fail* 1991; **13**: 1–4.  
4. Hess B, et al. Tubulointerstitial nephropathy persisting 20 months after discontinuation of chronic intake of germanium lactate citrate. *Am J Kidney Dis* 1993; **21**: 548–52.  
5. Tao SH, Bolger PM. Hazard assessment of germanium supplements. *Regul Toxicol Pharmacol* 1997; **25**: 211–19.  
6. Swennen B, et al. Epidemiological survey of workers exposed to inorganic germanium compounds. *Occup Environ Med* 2000; **57**: 242–8.

### Ginkgo Biloba

Árbol de los cuarenta escudos; EGB-761; Fossil Tree; GBE-761; Ginkgo, feuille de (ginkgo leaf); Ginkgo folium (ginkgo leaf); Ginkgolblad (ginkgo leaf); Ginkmedžiu lapai (ginkgo leaf); Jinanový list (ginkgo leaf); Kew Tree; Maidenhair Tree; Neidondhiuspunlehti (ginkgo leaf); Páfrányfenyőlevél (ginkgo leaf); *Salisburia adiantifolia*.

Гинкго Билоба

ATC — N06DX02.

ATC Vet — QN06DX02.

**Pharmacopoeias.** In *Chin.*, *Eur.* (see p.vii), and *US. Eur.* (see p.vii) also includes Ginkgo Dry Extract, Refined and Quantified. *US* includes a powdered extract.

**Ph. Eur. 6.2** (Ginkgo Leaf). The whole or fragmented dried leaf

of *Ginkgo biloba* containing not less than 0.5% of flavonoids, calculated as flavone glycosides with reference to the dried drug. The leaf is greyish or yellowish-green or yellowish-brown.

**USP 31** (Ginkgo). The dried leaf of *Ginkgo biloba* (Ginkgoaceae) containing not less than 0.5% of flavonoids, calculated as flavonol glycosides, with a mean molecular mass of 756.7, and not less than 0.1% of terpene lactones, both on the dried basis. The leaf is khaki green to greenish-brown. Protect from light and moisture.

### Adverse Effects

Adverse effects include headaches, dizziness, palpitations, gastrointestinal disturbances, bleeding disorders, and skin hypersensitivity reactions.

**Poisoning.** Reports<sup>1,2</sup> of convulsions induced by ingestion of large amounts of ginkgo seeds. Convulsions were thought to be due to the presence of 4-metoxypyridoxine, a competitive antagonist of pyridoxine; giving suitable quantities of a vitamin-B<sub>6</sub> source may be of benefit in preventing such convulsions.<sup>2</sup>

1. Miwa H, et al. Generalized convulsions after consuming a large amount of ginkgo nuts. *Epilepsia* 2001; **42**: 280–1.  
2. Kajiyama Y, et al. Ginkgo seed poisoning. *Pediatrics* 2002; **109**: 325–7.

### Interactions

It has been suggested that ginkgo biloba should be used with caution in patients receiving anticoagulants or drugs that affect platelet aggregation. For reference to a possible interaction with *warfarin*, see p.1431.

### Uses and Administration

An extract from the leaves of *Ginkgo biloba* has been used in cerebrovascular and peripheral vascular disorders. It is also being investigated in Alzheimer's disease, multi-infarct dementia, and in tinnitus. *Ginkgo biloba* is a source of ginkgolides (below).

**Homoeopathy.** *Ginkgo biloba* has been used in homoeopathic medicines under the following names: Ginkgo.

**Cerebrovascular disorders.** A systematic review<sup>1</sup> of 10 randomised or quasi-randomised studies concluded that the routine use of ginkgo biloba extracts to promote recovery after ischaemic stroke was not supported by any convincing evidence, and that larger better quality studies were required.

1. Zeng X, et al. Ginkgo biloba for acute ischaemic stroke. Available in the Cochrane Database of Systematic Reviews; Issue 4. Chichester: John Wiley; 2005 (accessed 23/05/06).

**Dementia.** *Ginkgo biloba* extracts have been tried in the treatment of dementia including Alzheimer's disease (p.362). Meta-analyses<sup>1–3</sup> have found the extracts to be more effective than placebo in some cases but results are inconsistent and unconvincing<sup>3</sup> and the authors of all analyses commented that further investigation is needed to establish any clinical value. A subsequent study found no evidence of benefit.<sup>4</sup> Another study assessing whether ginkgo biloba can prevent cognitive decline in very elderly people with normal memory function found positive effects only after adjustment for noncompliance.<sup>5</sup> In this study<sup>5</sup> a greater number of cases of stroke or transient ischaemic attacks was noted in those given ginkgo biloba but further study is required to confirm any link to use of ginkgo.

1. Oken BS, et al. The efficacy of ginkgo biloba on cognitive function in Alzheimer disease. *Arch Neurol* 1998; **55**: 1409–15.  
2. Ernst E, Pittler MH. Ginkgo biloba for dementia: a systematic review of double-blind, placebo-controlled trials. *Clin Drug Invest* 1999; **17**: 301–8.  
3. Birks J, Grimley Evans J. Ginkgo biloba for cognitive impairment and dementia. Available in The Cochrane Database of Systematic Reviews; Issue 2. Chichester: John Wiley; 2007 (accessed 02/05/08).  
4. McCarney R, et al. Ginkgo biloba for mild to moderate dementia in a community setting: a pragmatic, randomised, parallel-group, double-blind, placebo-controlled trial. *Int J Geriatr Psychiatry* 2008. Available at doi: 10.1002/gps.2055  
5. Dodge HH, et al. A randomized placebo-controlled trial of Ginkgo biloba for the prevention of cognitive decline. *Neurology* 2008; **70**: 1809–17.

**Peripheral vascular disorders.** *Ginkgo biloba* extracts have been tried in the treatment of peripheral vascular disorders (p.1178). A meta-analysis<sup>1</sup> found the extracts to be more effective than placebo in the symptomatic treatment of intermittent claudication, although the authors considered the size of the effect to be modest and of uncertain clinical relevance.

1. Pittler MH, Ernst E. Ginkgo biloba extract for the treatment of intermittent claudication: a meta-analysis of randomized trials. *Am J Med* 2000; **108**: 276–81.

**Tinnitus.** *Ginkgo biloba* extracts have been tried in the treatment of tinnitus (p.1866). A systematic review<sup>1</sup> of 5 randomised controlled studies cautiously concluded that these results were favourable, although a later systematic review<sup>2</sup> failed to show benefit.

1. Ernst E, Stevinson C. Ginkgo biloba for tinnitus: a review. *Clin Otolaryngol* 1999; **24**: 164–7.  
2. Hilton M, Stuart E. Ginkgo biloba for tinnitus. Available in The Cochrane Database of Systematic Reviews; Issue 2. Chichester: John Wiley; 2004 (accessed 23/05/06).

### Preparations

**USP 31:** Ginkgo Capsules; Ginkgo Tablets.

**Proprietary Preparations** (details are given in Part 3)

**Arg.:** Clarvix; Herbaccion Cerebral; Kalter; Tanakan; **Austral.:** Proginogin; **Tavonin†;** **Austria:** Cerebokan; Ceremin; Gingoheal; Gingo; Tebofortan; **Tavonin†;** **Belg.:** Memfit; Tanakan; **Tavonin†;** **Braz.:** Binkof; Bioflavin; Cli-

bium†; Dinaton; Equitam; Giblon; Ginbiloba; Gincobem; Gincolin; Ginkoba; Ginkobil†; Ginkofarma†; Ginkogreen; Ginkolab; Ginkomed; Ginkopuls; Gyncobem; Kiadon†; Krsan; Mensana†; Oxian; Tanakan; **Tebonin†;** **Chile:** Kiadon; Memolit; Ment Vital†; Nolakar; Rokan; Tebokan†; **Cz.:** Gingo; Gingium†; Tanakan; **Tebokan†;** **Fr.:** Ginkogin; Tanakan; **Tramisal†;** **Ger.:** Alzi; Duogink; Gincuran†; Gingloba; Gingium; Gingobeta; Gingopret; Ginkobil; Ginkodiat; Ginkokant†; Ginkopur; Isoginkogin; Kaven; Rokan; **Tebonin†;** **Gr.:** Tanacan; **Tebokan†;** **Hong Kong:** Ebamin; Ginkolin; Tanakan; **Hung.:** Bilobil; Gingium; Ginkgold; Tanakan; Tebofortan; **Tebonin†;** **Indon.:** Brenja; Ginkgan; Ginkgoferoc; Ginkona; Lanaginkola; **Ital.:** Ginkoba; Novel Ginkgo†; **Malaysia:** Appeton Memocap†; Giloba; Gincare; Ginkocer†; Tanakan; **Mex.:** Biogink†; Kolob†; Nemoril; Tanakan†; **Tebonin†;** **Vasodil†;** **Neth.:** Tavonin; **Philipp.:** Ginkocer; **Tebokan†;** **Pol.:** Bilobil; Geriacaps; Ginkgomax; Ginkofar; Herbabiloba; Memoplant; Tanakan; **Port.:** Abobil; Biloban; Gincoben; Ginkofal†; **Vasacife†;** **Rus.:** Bilobil (Билобил); Ginos (Гинос); Memoplant (Мемоплант); Tanakan (Танакан); **Singapore:** Gincare; Ginxin-F†; Ginkapran; Ginkosen; Gitako; Neuroxin; Tanakan; **Tebonin†;** **Spain:** Fitokey Ginkgo; Normocid†; Tanakene; **Switz.:** Demonatur Ginkgo; Geriaferoc; Gingsol; Oxavel†; Symfona; Tanakene; Tebofortin†; **Tebokan†;** Valverde Vitalite dragees†; **Thai.:** Tanakan; **Turk.:** Gingobil; Tanakan; **UK:** Ginkovital; **USA:** BioGinkgo; **Venez.:** Kiadon; Neukob; Tanakan; **Tebokan†;** Varginko.

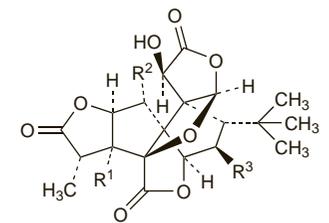
**Multi-ingredient:** **Arg.:** Centellase de Centella Queen; Flibitol; Garcinol Max†; GB 100; Ginkgo Biloba Forte; Ginkgo Biloba Memo Diates; Ginkgo Forte; Herbaccion Celfin; Herbaccion Memory; Neuroton; SCV 300; Snell Patch; Snell Progress; Top Life Memory†; Venoful; VNS 45; **Austral.:** Bilberry Plus Eye Health; Biogan Vision-Eze; Biogan Zelleulan with Escin; Clemens Tonic; Extralife Extra-Brite; Extralife Eye-Care; Extralife Leg-Care; Eye Health Herbal Plus Formula 4; For Peripheral Circulation Herbal Plus Formula 5; Gingo A†; Ginkgo Biloba Plus†; Ginkgo Complex†; Ginkgo Plus Herbal Plus Formula 10†; Herbal Arthritis Formula†; Herbal Capillary Care†; Lifechange Circulation Aid†; Lifechange Multi Plus Antioxidant†; Life-system Herbal Formula 6 For Peripheral Circulation†; Life-system Herbal Plus Formula 11; Ginkgolife; LifeSystem Herbal Plus Formula 5 Eye Relief; Prophthal†; **Vig. Braz.:** Composito Anticelulitico†; Derm'active Solaire†; Traumed†; **Canad.:** Ginkoba†; **Chile:** Celtech Gold; Gincosan; Gingo-Ther†; Mentania; Sebiom AKN; **Cz.:** Gincosan; Ginkgo Forte; **Fr.:** Ginkor; Ginkor Forte; Photoderm Flush†; Sebiom AKN; **Ger.:** Perivar†; Veno-Tebonin N†; **Hong Kong:** Flavo-C; Ginkgo Plus Vivo-Livo†; Ginkgo-PS†; Ginkor Forte; **Hung.:** Ginkor Forte; **Indon.:** Cereton; Ginkolan; Hemaviton Brain Nutrient; Proseval; **Ital.:** Angioton; Angiovein; Forticin; Ginkoba Active; Ginkofal; Ginkoret; Memoactive†; Memorandum; Neuraalta Migren; Pik Gel; Pollingel con Ginkgo Biloba†; Pulsalul; Varicoof; Vasobrain; Vasobrain Plus; Vasopt; Venalta; Vertiginkgo; **Malaysia:** Cerestart†; Circarot; Ginkor Forte; Total Man†; **Mex.:** Maxbiloba; **Philipp.:** Circulan; Nutrotal; **Pol.:** Bioginko; **Cardiobonisol;** GinkgoCard; Intelektan; Passibil; Venoforton; **Rus.:** Ginkor Forte (Гинкор Форте); Ginkor Gel (Гинкор Гель); **Singapore:** Ginkgo-PS; Memoloba†; **Switz.:** Allium Plus; Arterosan Plus; Capsules-vital; Gincosan; Trallin; **Thai.:** Ginkor Forte; **UK:** ProBrain; **USA:** Aphroform; Cavenin; Dorofen; Gentaplex; **Venez.:** Sebiom AKN; Sengobil.

### Ginkgolides

Ginkgolíidos.

Гинкголиды

CAS — 15291-75-5 (ginkgolide A); 15291-77-7 (ginkgolide B); 15291-76-6 (ginkgolide C).



	R <sup>1</sup>	R <sup>2</sup>	R <sup>3</sup>
ginkgolide A	OH	H	H
ginkgolide B	OH	OH	H
ginkgolide C	OH	OH	OH

(ginkgolide A)

**Description.** Ginkgolides A, B, and C (BN-52020, BN-52021, and BN-52022 respectively) are isolated from *Ginkgo biloba* (Ginkgoaceae) (see above).

### Profile

Ginkgolides are terpenoid molecules isolated from *Ginkgo biloba* (above), with platelet-activating factor (PAF) antagonist properties. They have been investigated as BN-52063, a mixture of ginkgolides A (BN-52020), B (BN-52021), and C (BN-52022), for asthma and other inflammatory and allergic disorders, and also in immune disorders such as endotoxic shock and graft rejection; ginkgolide B, which has the most potent PAF antagonist properties, has been tried alone in similar conditions.

Other ginkgolides, including ginkgolide M (BN-52023) and ginkgolide J (BN-52024), have also been identified.

### References

1. Braquet P. The ginkgolides: potent platelet-activating factor antagonists isolated from *Ginkgo biloba* L: chemistry, pharmacology and clinical applications. *Drugs Of The Future* 1987; **12**: 643–99.  
2. Chung KF, et al. Effect of a ginkgolide mixture (BN 52063) in antagonising skin and platelet responses to platelet activating factor in man. *Lancet* 1987; **i**: 248–51.

The symbol † denotes a preparation no longer actively marketed