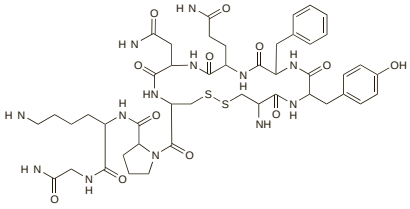
Lypressin *(BAN, USAN, rINN)*

L-8; Lipresina; Lipressina; Lipresszin; LVP; Lypressiini; Lypressine; Lypressinum. [8-Lysine]vasopressin; Cys-Tyr-Phe-Gln-Asn-Cys-Pro-Lys-Gly-NH_2 cyclic (1→6) disulphide.

Липрессин

$C_{46}H_{65}N_{13}O_{12}S_2$ = 1056.2.
CAS — 50-57-7.
ATC — H01BA03.
ATC Vet — QH01BA03.



Description. Lypressin is the form of vasopressin present in the posterior pituitary of pigs.

Pharmacopoeias. *US* includes Lypressin Nasal Solution.

Incompatibility. Vasopressin was shown to be physically compatible (when injected at the Y-site in an intravenous tubing set) when tested in intravenous fluids with other drugs commonly used in cardiac arrest.[1] However, tests of vasopressin with drugs commonly used in septic shock showed physical incompatibility with phenytoin (when mixed in infusion bags).[2] Precipitation has also been reported[3] with vasopressin and furosemide together in intravenous fluids (tested at the Y-site).

1. Feddema S, *et al.* Physical compatibility of vasopressin with medications commonly used in cardiac arrest. *Am J Health-Syst Pharm* 2003; **60:** 1271–2.
2. Barker B, *et al.* Visual compatibility of vasopressin with other injectable drugs. *Am J Health-Syst Pharm* 2005; **62:** 1969, 1975–6.
3. Faria CE, *et al.* Visual compatibility of furosemide with phenylephrine and vasopressin. *Am J Health-Syst Pharm* 2006; **63:** 906–8.

Units

7.7 units of lypressin are contained in about 23.4 micrograms of synthetic peptide (with albumin 5 mg and citric acid) in one ampoule of the first International Standard (1978).

Adverse Effects

Large parenteral doses of vasopressin may give rise to marked pallor, pounding headache, vertigo, sweating, tremor, nausea, vomiting, diarrhoea, eructation, cramp, and a desire to defaecate; some of these effects may also occur after large intranasal doses of lypressin. In women, vasopressin may cause uterine cramps of a menstrual character. Hyponatraemia with water retention and signs of water intoxication can occur.

Hypersensitivity reactions have occurred and include urticaria and bronchoconstriction. Anaphylactic shock and cardiac arrest have been reported.

Vasopressin may constrict coronary arteries. Chest pain, myocardial ischaemia, and infarction have occurred following injection, and fatalities have been reported. Other cardiovascular effects include occasional reports of arrhythmias and bradycardia, as well as hypertension. Peripheral vasoconstriction has resulted in gangrene, and thrombosis as well as local irritation at the injection site may occur.

Nasal congestion, irritation, and ulceration have been reported occasionally after intranasal use, usually as lypressin; systemic effects at usual intranasal doses are mostly reported to be mild.

Effects on the heart. Arrhythmias, including ventricular tachycardia and fibrillation,[1] torsade de pointes,[2-4] and asystole[5] are among the adverse effects of vasopressin. Paradoxical bradycardia and hypotension have also been reported.[6]

1. Kelly KJ, *et al.* Vasopressin provocation of ventricular dysrhythmia. *Ann Intern Med* 1980; **92:** 205–6.
2. Eden E, *et al.* Ventricular arrhythmia induced by vasopressin: torsade de pointes related to vasopressin-induced bradycardia. *Mt Sinai J Med* 1983; **50:** 49–51.
3. Stein LB, *et al.* Fatal torsade de pointes occurring in a patient receiving intravenous vasopressin and nitroglycerin. *J Clin Gastroenterol* 1992; **15:** 171–4.
4. Faigel DO, *et al.* Torsade de pointes complicating the treatment of bleeding esophageal varices: association with neuroleptics, vasopressin, and electrolyte imbalance. *Am J Gastroenterol* 1995; **90:** 822–4.
5. Fitz JD. Vasopressin induction of ventricular ectopy. *Arch Intern Med* 1982; **142:** 644.
6. Kraft W, *et al.* Paradoxical hypotension and bradycardia after intravenous arginine vasopressin. *J Clin Pharmacol* 1998; **38:** 283–6.

Ischaemia. Reports of ischaemia and infarction associated with vasopressin.[1-10]

1. Greenwald RA, *et al.* Local gangrene: a complication of peripheral Pitressin therapy for bleeding esophageal varices. *Gastroenterology* 1978; **74:** 744–6.
2. Colombani P. Upper extremity gangrene secondary to superior mesenteric artery infusion of vasopressin. *Dig Dis Sci* 1982; **27:** 367–9.
3. Lambert M, *et al.* Reversible ischemic colitis after intravenous vasopressin therapy. *JAMA* 1982; **247:** 666–7.
4. Anderson JR, Johnston GW. Development of cutaneous gangrene during continuous peripheral infusion of vasopressin. *BMJ* 1983; **287:** 1657–8.
5. Reddy KR, *et al.* Bilateral nipple necrosis after intravenous vasopressin therapy. *Arch Intern Med* 1984; **144:** 835–6.
6. Brearly S, *et al.* A lethal complication of peripheral vein vasopressin infusion. *Hepatogastroenterology* 1985; **32:** 224–5.
7. Sweren BS, Bohlman ME. Gastric and splenic infarction: a complication of intraarterial vasopressin infusion. *Cardiovasc Intervent Radiol* 1989; **12:** 207–9.
8. Maceyko RF, *et al.* Vasopressin-associated cutaneous infarcts, alopecia, and neuropathy. *J Am Acad Dermatol* 1994; **31:** 111–13.
9. Lin RY, *et al.* Vasopressin-induced amber-like skin necrosis. *Dermatology* 1997; **195:** 271–3.
10. Dunser MW, *et al.* Ischemic skin lesions as a complication of continuous vasopressin infusion in catecholamine-resistant vasodilatory shock: incidence and risk factors. *Crit Care Med* 2003; **31:** 1394–8.

Treatment of Adverse Effects

The antidiuretic effects on water retention and sodium imbalance may be treated by water restriction and a temporary withdrawal of vasopressin. Severe cases may require osmotic diuresis alone or with furosemide.

Extravasation. Localised intravenous and intra-arterial guanethidine was used in the treatment of a patient with extravasation of vasopressin.[1] The intra-arterial use of guanethidine was considered to have helped to avoid necrotic changes.

1. Crocker MC. Intravascular guanethidine in the treatment of extravasated vasopressin. *N Engl J Med* 1981; **304:** 1430.

Precautions

Vasopressin should not be used in patients with chronic nephritis with nitrogen retention. It should be avoided or given only with extreme care, and in small doses, to patients with vascular disease, especially of the coronary arteries.

It should be given with care to patients with conditions which might be aggravated by water retention including asthma, epilepsy, migraine, and heart failure. Fluid intake should be adjusted to avoid hyponatraemia and water intoxication. Care is also required in hypertension or other conditions that may be exacerbated by a rise in blood pressure. Nasal absorption of vasopressin may be impaired in patients with rhinitis.

Abuse. Vasopressin or its analogues have been abused as so-called 'smart drugs' for their supposed effect on memory recall and cognition.

Resistance. Antibodies to vasopressin were detected in 6 of 28 patients being treated for diabetes insipidus, all of whom had a decrease in antidiuretic effect with previously effective argipressin or lypressin therapy;[1] desmopressin and chlorpropamide remained effective in these patients. There have been reports of patients with diabetes insipidus of pregnancy unresponsive to argipressin but responsive to desmopressin.[2] This was probably due to excessive placental production of vasopressinase, an enzyme which degrades argipressin.

1. Vokes TJ, *et al.* Antibodies to vasopressin in patients with diabetes insipidus: implications for diagnosis and therapy. *Ann Intern Med* 1988; **108:** 190–5.
2. Shah SV, Thakur V. Vasopressinase and diabetes insipidus of pregnancy. *Ann Intern Med* 1988; **109:** 435–6.

Interactions

The antidiuretic effects of vasopressins might be expected to be enhanced in some patients receiving chlorpropamide, clofibrate, carbamazepine, fludrocortisone, urea, or tricyclic antidepressants. Lithium, heparin, demeclocycline, noradrenaline, and alcohol may decrease the antidiuretic effect. Ganglion-blocking drugs may increase sensitivity to the pressor effects of vasopressins.

Cimetidine. A report of severe bradycardia and heart block leading to asystole in a patient given combined vasopressin and cimetidine therapy.[1]

1. Nikolic G, Singh JB. Cimetidine, vasopressin and chronotropic incompetence. *Med J Aust* 1982; **2:** 435–6.

Uses and Administration

Vasopressin is secreted by the hypothalamus and stored in the posterior lobe of the pituitary gland. It may be prepared from the gland of mammals or by synthesis. Vasopressin has a direct antidiuretic action on the kidney, increasing tubular reabsorption of water. It also constricts peripheral blood vessels and causes contraction of the smooth muscle of the intestine, gallbladder, and urinary bladder. It has practically no oxytocic activity.

Vasopressin, which is usually given parenterally or intranasally in the synthetic forms of argipressin or lypressin, is used in the treatment of cranial diabetes insipidus due to a deficiency in antidiuretic hormone. It is ineffective in nephrogenic diabetes insipidus. Argipressin has also been used in the prevention and treatment of postoperative abdominal distension, and was formerly given to remove gas in abdominal visualisation procedures. Argipressin or lypressin are used in the treatment of bleeding oesophageal varices. Argipressin may have a role in cardiopulmonary resuscitation and shock due to vasodilatation.

In the treatment of cranial diabetes insipidus to control polyuria, argipressin may be given subcutaneously or intramuscularly; the dose in the UK is 5 to 20 units every 4 hours. In the USA, 5 to 10 units given 2 or 3 times daily or more has been used. Alternatively, argipressin or lypressin has been given as a nasal spray; dosage should be individually adjusted as required. A long-acting oily suspension of vasopressin tannate was formerly used by intramuscular injection in diabetes insipidus.

In the initial control of variceal bleeding argipressin is given in an initial dose of 20 units in 100 mL of glucose 5% infused intravenously over 15 minutes. Lypressin has also been given for bleeding oesophageal varices. Doses for children are given under Administration in Children, below.

Vasopressin has also been used as a vasoconstrictor in local anaesthetic injections.

Administration. Results[1] suggesting that although intravenous argipressin produced much higher plasma concentrations than intranasal, the latter evoked a greater CNS response.

1. Pietrowsky R, *et al.* Brain potential changes after intranasal vs intravenous administration of vasopressin: evidence for a direct nose-brain pathway for peptide effects in humans. *Biol Psychiatry* 1996; **39:** 332–40.

Administration in children. Although not licensed in the UK for use in children, the *BNFC* includes a dose for adjunctive treatment of acute massive haemorrhage of the gastrointestinal tract or oesophageal varices in patients aged from 1 month to 18 years. An initial dose of 0.3 units/kg (up to 20 units) is given intravenously over 20 to 30 minutes, followed by a continuous infusion of 0.3 units/kg per hour adjusted according to response to a maximum of 1 unit/kg per hour. If the bleeding stops the infusion is continued at the same dose for 12 hours, then gradually withdrawn over 24 to 48 hours; the maximum duration of treatment should be 72 hours.

Vasopressin given by continuous intravenous infusion in an average dose of 9 milliunits/kg per hour was safe and effective in 5 children who had diabetes insipidus as a manifestation of severe brain injury.[1] A dose of 1.5 to 3 milliunits/kg per hour has also been used safely for postoperative diabetes insipidus in 2 children aged 3 years and under.[2] Similar initial doses of argipressin were used in 3 comatose children with cranial diabetes insipidus,[3] while a published algorithm for the management of acute cranial diabetes insipidus has recommended an initial dose of vasopressin of 0.25 to 1 milliunits/kg per hour, subsequently titrated to achieve an appropriate output and specific gravity of urine, and a serum sodium value of between 140 and 145 mmol/litre.[4]

1. Ralston C, Butt W. Continuous vasopressin replacement in diabetes insipidus. *Arch Dis Child* 1990; **65:** 896–7.
2. McDonald JA, *et al.* Treatment of the young child with postoperative central diabetes insipidus. *Am J Dis Child* 1989; **143:** 201–4.
3. Lee Y-J, *et al.* Continuous infusion of vasopressin in comatose children with neurogenic diabetes insipidus. *J Pediatr Endocrinol Metab* 1995; **8:** 257–62.
4. Lugo N, *et al.* Diagnosis and management algorithm of acute onset of central diabetes insipidus in critically ill children. *J Pediatr Endocrinol Metab* 1997; **10:** 633–9.

Advanced cardiac life support. Vasopressin (as argipressin) may be used as an alternative to adrenaline in cardiopulmonary resuscitation (see p.1156). In a preliminary study argipressin 40 units by intravenous injection appeared to be of value in the treatment of cardiac arrest due to ventricular fibrillation.[1] Spontaneous circulation returned in 16 of 20 patients so treated; 14 were successfully resuscitated on arrival in hospital and 8 survived to be discharged. In comparison, of 20 patients treated with 1 mg of adrenaline intravenously only 7 were resuscitated and 3 survived till discharge. However, a larger study[2] found no difference between vasopressin and adrenaline in the rates of survival to hospital admission for patients with ventricular fibrillation or pulseless electrical activity, although vasopressin was associated with a higher rate of hospital admission and discharge among patients with asystole. It also found that two doses of vasopressin followed by a single dose of adrenaline resulted in a better survival rate than three doses of adrenaline. Another large study[3] of patients who experienced cardiac arrest while in hospital and were treated with either vasopressin 40 units or adrenaline 1 mg, found no difference in survival to discharge from hospital. A systematic review[4] of 5 trials, including these 3, found no clear advantage for the use of vasopressin over adrenaline in the treatment of cardiac arrest.

1. Lindner KH, *et al.* Randomised comparison of epinephrine and vasopressin in patients with out-of-hospital ventricular fibrillation. *Lancet* 1997; **349:** 535–7.
2. Wenzel V, *et al.* A comparison of vasopressin and epinephrine for out-of-hospital cardiopulmonary resuscitation. *N Engl J Med* 2004; **350:** 105–13.
3. Stiell IG, *et al.* Vasopressin versus epinephrine for inhospital cardiac arrest: a randomised controlled trial. *Lancet* 2001; **358:** 105–9.
4. Aung K, Htay T. Vasopressin for cardiac arrest: a systematic review and meta-analysis. *Arch Intern Med* 2005; **165:** 17–24.

Diabetes insipidus. For a discussion of diabetes insipidus and its management, including reference to the use of vasopressin analogues (particularly desmopressin), see p.2179.

Haemorrhagic disorders. There are reports of vasopressin being used in the management of various haemorrhagic disorders including blood loss in abortion and caesarean section[1,2] and haemoptysis.[3,4] Infusion of vasopressin into the superior or inferior mesenteric artery has been used in the management of lower gastrointestinal bleeding, but modern embolisation techniques may be associated with fewer complications.[5] For the use of va-

sopressin in upper gastrointestinal variceal haemorrhage, see below.

1. Schulz KF, *et al.* Vasopressin reduces blood loss from second-trimester dilatation and evacuation abortion. *Lancet* 1985; **ii:** 353–6.
2. Lurie S, *et al.* Subendometrial vasopressin to control intractable placental bleeding. *Lancet* 1997; **349:** 698.
3. Noseworthy TW, Anderson BJ. Massive hemoptysis. *Can Med Assoc J* 1986; **135:** 1097–9.
4. Bilton D, *et al.* Life threatening haemoptysis in cystic fibrosis: an alternative therapeutic approach. *Thorax* 1990; **45:** 975–6. Correction. *ibid.* 1991; **46:** 274.
5. Darcy M. Treatment of lower gastrointestinal bleeding: vasopressin infusion versus embolization. *J Vasc Interv Radiol* 2003; **14:** 535–43.

Nocturnal enuresis. For references to the use of the vasopressin analogue, desmopressin, in nocturnal enuresis, see p.2187.

Shock. Argipressin has been reported to have beneficial vasopressor effects in the management of shock (p.1183) due to vasodilatation. It has been given by continuous intravenous infusion at a dose of about 2 to 6 units/hour as supplemental therapy in patients who could not be adequately managed with conventional vasopressor therapy.[1,2] In a retrospective study[3] vasopressin given with or without catecholamines for haemodynamic support of shock did not increase the incidence of venous thromboembolism compared with catecholamines given alone. Further reports[4,5] of the benefit of vasopressin in septic shock suggest that it may be of value in reducing doses of catecholamine vasopressors.

1. Dünser MW, *et al.* Management of vasodilatory shock: defining the role of arginine vasopressin. *Drugs* 2003; **63:** 237–56.
2. Dünser MW, *et al.* Arginine vasopressin in advanced vasodilatory shock: a prospective, randomized, controlled study. *Circulation* 2003; **107:** 2313–19.
3. Doepker BA, *et al.* Thromboembolic events during continuous vasopressin infusions: a retrospective evaluation. *Ann Pharmacother* 2007; **41:** 1383–9.
4. Obritsch MD, *et al.* Effects of continuous vasopressin infusion in patients with septic shock. *Ann Pharmacother* 2004; **38:** 1117–22.
5. Szumita PM, *et al.* Vasopressin for vasopressor-dependent septic shock. *Am J Health-Syst Pharm* 2005; **62:** 1931–6.

Variceal haemorrhage. Vasopressin has been widely used to control bleeding from oesophageal varices, as discussed under Monoethanolamine, on p.2346. However, terlipressin, and more recently octreotide, have been found to have some advantages over vasopressin, including bolus dosage and fewer adverse effects, and octreotide is increasingly preferred for this purpose. Glyceryl trinitrate has been given with the aim of counteracting the adverse cardiac effects of vasopressin while potentiating its beneficial effects on portal pressure.[1-4]

1. Stump DL, Hardin TC. The use of vasopressin in the treatment of upper gastrointestinal haemorrhage. *Drugs* 1990; **39:** 38–53.
2. Williams SGJ, Westaby D. Management of variceal haemorrhage. *BMJ* 1994; **308:** 1213–17.
3. Sung JJY. Non-surgical treatment of variceal haemorrhage. *Br J Hosp Med* 1997; **57:** 162–6.
4. McCormack G, McCormack PA. A practical guide to the management of oesophageal varices. *Drugs* 1999; **57:** 327–35.

Preparations

USP 31: Lypressin Nasal Solution; Vasopressin Injection.

Proprietary Preparations (details are given in Part 3)
Austral.: Pitressin; ***Canad.:*** Pressyn; ***Ger.:*** Pitressin†; ***Gr.:*** Pitressin†; ***Irl.:*** Pitressin; ***NZ:*** Pitressin; ***UK:*** Pitressin; ***USA:*** Pitressin.

Used as an adjunct in: ***Thai.:*** Neo-Lidocaton†.

Vegetable Fatty Oils

Kasvirasvaöljyt; Olea Herbaria; Oljor, feta, vegetabiliska.

Pharmacopoeias. In *Eur.* (see p.vii).
Ph. Eur. 6.2 (Vegetable Fatty Oils). Vegetable fatty oils are mainly solid or liquid triglycerides of fatty acids that may contain small amounts of other lipids such as waxes, free fatty acids, partial glycerides, or unsaponifiable matters. They are obtained from the seeds or fruits of plants by expression and/or solvent extraction, and may then be refined or hydrogenated with the addition of a suitable antoxidant if necessary. The following are defined:

- *virgin oil*: the oil obtained from raw materials of special quality by mechanical procedures such as cold expression or centrifugation.
- *refined oil*: the oil obtained by expression and/or solvent extraction, and subsequently, either alkali refining (followed by bleaching and deodorisation) or physical refining.
- *hydrogenated oil*: an oil obtained by expression and/or solvent extraction, and subsequently, either alkali refining or physical refining, then possible bleaching, followed by drying, hydrogenation, and subsequently bleaching and deodorisation.

Only phosphoric acid and alkali refined oils may be used in the preparation of parenteral dosage forms.

Hydrogenated Vegetable Oil

Aceite vegetal hidrogenado.

Pharmacopoeias. In *Br. Jpn* allows under the title Hydrogenated Oil a product from fish, other animals or vegetables. Also in *USNF*.
BP 2008 (Hydrogenated Vegetable Oil). A mixture of triglycerides of fatty acids of vegetable origin. An almost white, fine powder at room temperature and a pale yellow, oily liquid above its m.p. of 57° to 70°. Practically insoluble in water; soluble in chloroform, in hot isopropyl alcohol, and in petroleum spirit. Store at a temperature of 8° to 25°.
USNF 26 (Hydrogenated Vegetable Oil). Type 1 Hydrogenated Vegetable Oil occurs as a fine, white powder, beads, or small flakes; m.p. 57° to 85°. Type 2 Hydrogenated Vegetable Oil occurs as a plastic (semi-solid) or flakes, having a softer consistency than Type 1; m.p. 20° to 50°.
Insoluble in water; soluble in chloroform, in hot isopropyl alcohol, and in petroleum spirit. Store in airtight containers at a temperature of 8° to 15°.

Profile

Vegetable fatty oils are generally solid or liquid triglycerides of fatty acids that may contain small amounts of other lipids. They are obtained from the seeds or fruits of plants by expression and/or solvent extraction, and may then be refined or hydrogenated with the addition of a suitable antoxidant if necessary. They are fixed oils (expressed oils) and do not evaporate on warming as opposed to essential oils (ethereal oils, volatile oils), which evaporate readily and are usually obtained from their aromatic plant source by distillation. Some fixed vegetable oils are used to modify the consistency of ointments and for their emollient properties. They have also been used as vehicles for fat-soluble substances such as vitamins.

Hydrogenated vegetable oil is refined, bleached, hydrogenated, and deodorised vegetable oil stearins consisting mainly of the triglycerides of stearic and palmitic acids. It is used as a tablet lubricant and as an ointment or suppository basis.

Preparations

Proprietary Preparations (details are given in Part 3)
Spain: Blodex†.

Veratrine

Veratriini; Veratrin; Veratrina; Veratrinum.
CAS — 8051-02-3 (veratrine mixture); 71-62-5 (veratrine amorphous); 62-59-9 (veratrine crystallised, cevadine).

Description. Veratrine is a mixture of alkaloids from the dried ripe seeds of *Schoenocaulon officinale* (Liliaceae) (sabadilla). Veratrine should be distinguished from protoveratrines obtained from veratrum.

Adverse Effects, Treatment, and Precautions

Veratrine resembles aconite (p.2246) in its action on the peripheral nerve endings and poisoning should be treated similarly. It is an intense local irritant and has a powerful direct stimulating action on all muscle tissues. It has a violent irritant action on mucous membranes, even in minute doses, and must be handled with great care. When ingested it causes violent vomiting, purging, an intense burning sensation in the mouth and throat, and general muscular weakness.

Uses and Administration

Veratrine should not be used internally. It was formerly applied externally for its analgesic properties and as a parasiticide, especially for head lice, but even when used in this way there is danger of systemic poisoning from absorption.

Green Veratrum

American Hellebore; American Veratrum; Eléboro verde; Green Hellebore; Green Hellebore Rhizome; Veratro Verde; Veratrum Viride.
CAS — 8002-39-9.
ATC — C02KA01.
ATC Vet — QC02KA01.

Description. Green veratrum consists of the dried rhizome and roots of *Veratrum viride* (Liliaceae) from which are derived the alkaloidal mixtures alkavervir and cryptenamine.

White Veratrum

Eléboro blanco; European Hellebore; Veratrum Album; White Hellebore; White Hellebore Rhizome.
ATC — C02KA01.
ATC Vet — QC02KA01.

Description. White veratrum consists of the dried rhizome and roots of *Veratrum album* (Liliaceae) from which are derived the alkaloids protoveratrine A and B.

Adverse Effects

Veratrum alkaloids may cause nausea and vomiting at conventional therapeutic doses. Other adverse effects include epigastric and substernal burning, sweating, mental confusion, bradycardia or cardiac arrhythmias, dizziness, and hiccup. Profound hypotension and respiratory depression can occur at high doses.

Sneezing powder. Various symptoms of intoxication occurred in 7 patients due to the use of a sneezing powder containing white veratrum alkaloids.[1]

1. Fogh A, *et al.* Veratrum alkaloids in sneezing-powder: a potential danger. *J Toxicol Clin Toxicol* 1983; **20:** 175–9.

Treatment of Adverse Effects

After oral ingestion of veratrum alkaloids the stomach should be emptied by aspiration and lavage; activated charcoal may be considered within 1 hour of ingestion. Excessive hypotension with bradycardia or cardiac arrhythmias can be treated with atropine. The patient should be placed in a supine position with the feet raised.

Uses and Administration

White and green veratrum contain a number of pharmacologically active alkaloids that produce centrally mediated peripheral vasodilatation and bradycardia. They have been used in the treatment of hypertension but are generally considered to produce an unacceptably high incidence of adverse effects and have largely been replaced by less toxic antihypertensives.
Both green and white veratrum have also been used as insecticides.
Homoeopathy. White Veratrum has been used in homoeopathic medicines under the following names: Veratrum album; Ver. alb.

Verbascum

Aaron's Rod (*Verbascum thapsus*); Bouillon Blanc; Bouillon blanc, fleur de (mullein flower); Diviznový květ (mullein flower); Great Mullein (*Verbascum thapsus*); Kungsljusblomma (mullein flower); Mullein; Ökörfarkkoró virág (mullein flower); Orange Mullein (*Verbascum phlomoides*); Tūbių žiedai (mullein flower); Ukontulikukankukka (mullein flower); Verbasci flos (mullein flower); Wollblumen.

NOTE. The name Aaron's Rod has been applied to a number of plants including *V. densiflorum*, *Solidago* spp., and *Sempervivum tectorum*.

Pharmacopoeias. *Eur.* (see p.vii) includes the dried flowers.
Ph. Eur. 6.2 (Mullein Flower; Verbasci flos). The dried flowers, reduced to the corolla and the androecium, of *Verbascum thapsus*, *V. densiflorum*, and *V. phlomoides*. Store in airtight containers.

Profile

Verbascum flower is an ingredient of herbal remedies for cough and cold symptoms. The dried leaves and stems have also been used.

Preparations

Proprietary Preparations (details are given in Part 3)
Ger.: Eres N†; ***Pol.:*** Noverban.

Multi-ingredient: ***Austral.:*** Procold†; Verbascum Complex†; ***Austria:*** Brust- und Hustentee St Severin; ***Cz.:*** Naturland Grosser Swedenbitter†; Species Pectorales Planta; ***Fr.:*** Detoxell; ***Ger.:*** Equisil N; Hevertopect N†; ***Mex.:*** Bronkitose Mielimon; ***Pol.:*** Flegatussin; Gwajatussin; Termasil; ***Rus.:*** Original Grosser Bittner Balsam (Оригинальный Большой Бальзам Биттнера); ***Spain:*** Bronpul†; Natusor Broncopul†.

Verbenone

Werbenon. 2-Pinen-4-one; 4,6,6-Trimethylbicyclo[3.1.1]hept-3-en-2-one.
$C_{10}H_{14}O$ = 150.2.
CAS — 80-57-9 (verbenone); 18309-32-5 (d-verbenone); 1196-01-6 (l-verbenone).
ATC Vet — QR05CA11 (L-verbenone).

Profile

Verbenone is a terpene found in lemon-verbena oil, rosemary oil (p.2381) and some other essential oils. It has been used, sometimes with pine oil, for respiratory disorders.
Verbenone has also been used as an insect repellent in forestry.

Preparations

Proprietary Preparations (details are given in Part 3)
Ital.: Ozopulmin; Ozopulmin G.

Multi-ingredient: ***Ital.:*** Ozopulmin; Ozopulmin G.

Vervain

Herba Columbariae; Herba Verbenae; Shop Vervain Wort; Verbena; Verveine Officinale.

Pharmacopoeias. In *Chin.* and *Eur.* (see p.vii).
Ph. Eur. 6.2 (Verbena Herb). The whole or fragmented, dried aerial parts of *Verbena officinalis* collected during flowering. It contains a minimum of 15% of verbenalin ($C_{17}H_{24}O_{10}$ = 388.4) calculated with reference to the dried drug.

Profile

Vervain, the aerial parts of *Verbena officinalis* (Verbenaceae), has been used for a wide range of disorders. It is a bitter and has been used for digestive disorders. It also has sedative properties and