A survey on herbal galactagogues used in Europe

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RÉSUMÉ

Les plantes galactagogues des *Apiaceæ*, des *Fabaceæ*, des *Verbenaceæ*, des *Urticaceæ*, des *Renonculaceæ*, des *Lamiaceæ*, des *Malvaceæ*, des *Polygalaceæ* et des *Cupressaceæ* sont présentées.

Les plantes galactogogues prises en infusion ou décoction doivent être prises longtemps pour présenter un effet.

Breast-feeding not only supplies the optimum food for the infant but, in the past, offered the only guarantee for survival of the newborn. From earliest times of mankind a multitude of plant galactagogues has therefore been used in the folk medicine of all human cultures. It must be assumed that a good lot of these drugs work but by sympathetic magic. Strikingly, many galactagogues are obtained from plants containing a milky sap. This fact reminds of the medieval "Doctrine of Signatures" by PARACELSUS, according to which the plants possess signs that indicate their use. Though this doctrine cannot be scientifically validated, there are indeed several latex-producing plant species that are stated to be quite efficient in promoting lactation. Examples are the North American *Lygodesmia juncea* (Pursh) D. Don (*Asteraceæ* family), the "milk medicine" of the Cheyenne Indians (WEINER 1988), and the esteemed Central American Euphorbiaceae species *Euphorbia lancifolia* Schlecht. (ROIG Y MESA, 1974, ROSENGARTEN, 1982) — toxic drugs are skilfully administered by the traditional healers, so that their empirically gathered knowledge of the exact dosage prevents dangerous side effects.

Galactagogues are mainly used as decoctions or infusions, pressed sap of fresh plants, and admixtures to foods (*e.g.*, broth of plant parts cooked with pork); less frequent applications are cataplasms, admixtures to breast baths, and fumigants. The drugs are, in their majority, not exclusively employed to increase the flow of breast milk but serve as multifunctional remedies (cp. PERRY, 1980). Their use occasionally finds a parallel in popular veterinary practice to stimulate milk production in cattle and other mammals.

As regards European civilization, mentions of galactagogues are already found in the antique works by the Greek physician DIOSCORIDES (*c.* 50 after Chr.) and the Roman officer and scholar PLINY (27-79 after Chr.). These classic papers provided the basis for the famous herbals of the Renaissance era (BOCK H., 1577, FUCHS L., 1543, LONICERUS A., 1564, MATTHIOLUS P.A., 1562, and others). The largely uncritical recommendation of the drugs listed in them has hitherto lasted in folk medicinal publications (comments in MARZELL, 1923). It is quite doubtful if all of them deserve their ascribed reputation. In some cases, however, the efficacy of the traditional empirical use has experimentally been checked in modern human and veterinary medicine. Analyses of the active ingredients revealed a certain effect of volatile oils and saponins on gland secretion in general, thus also stimulating the mammary glands (GESSNER, 1953). Therefore, several plant species supplying galactagogue drugs are worth to be discussed in the present survey.

I. *APIACEÆ* FAMILY (*UMBELLIFERÆ*)

For millenia umbelliferous species have widely been used for their lactation-promoting properties. The drugs, perhaps the best-known European galactagogues, consist of the dried, ripe fruits (commonly but wrongly called "seeds"). The fruits are rich in volatile oils, the amount of which is still increasing upon storage.

Two species comparable as to active principle and efficacy are *Fœniculum vulgare* Mill. (fennel) and *Pimpinella anisum* L. (anise). They have a long history of medicinal use (cp. ALBERT-PULEO, 1980) and have been recommended in innumerable pharmaceutical and popular-science papers (*e.g.* BÖRNGEN, 1988, HOPPE, 1975, POPOV *et al.*, 1984, SIMON *et al.*, 1984). The content of volatile oil in the drug is 2-6%, its main constituent being anethole (50-90%). Anethole and its spontaneously forming polymers (dianethole, photoanethole) possess estrogenic activity. As SHARAF & GOMAA (1971) found out experimentally, anise oil in a dose of 0.1 ml was as potent as 0.1 µg estradiol, and its estrogenic effect was antagonized by 3 mg of progesterone. Estrogens stimulate the release of the

milk-producing hormone prolactin (PASTEELS, 1975).The influence on milk secretion might further be explained by the structural similarity of anethole and dopamine. Dopamine acts to inhibit the secretion of prolactin, but that effect could be repressed by a successful competition of anethole at the appropriate receptor sites (ALBERT-PULEO, *l.c.*).

Formerly, fennel and anise were often employed in veterinary practice. A study on lactating goats (RINGSEISEN, 1931) showed a certain but varying increase of milk volume and fat content that lasted for weeks after ceasing of anise oil application. Higher doses, however, resulted in a decline of milk amount. A comparable effect is cited by SCHULZ (1929), reporting on a nursing woman who, after the application of a concentrated fennel infusion, experienced a total drying up of lactation.

Two other well-known and widely used drugs, whose volatile oil consists chiefly of carvone (40-80%), are provided by *Carum carvi* L. (common caraway) and *Anethum graveolens* L. (dill). It must be questioned if "karos" of DIOSCORIDES and "careum" of PLINY correspond to the North and Central European common caraway (HEGI, 1926). The Greeks and Romans employed the drug of *Cuminum cyminum* L. (cumin) that is said to have similar galactagogue properties. The empirical use of dill is supported by extensive medical experience (BERGER, 1952). Further umbelliferous drugs come from *Myrrhis odorata* (L.) Scop. (sweet cicely, myrrh) and *Coriandrum sativum* L. (coriander). The latter has scarcely been applied as galactagogue in Europe but is applied for that purpose at the Malay Peninsula (PERRY, *l.c.*).

All mentioned drugs are commonly administered in the form of an infusion (*c.* 2 teaspoonsful on a cup of boiling water let stand for 10-15 min). They may be used singly or in a mixture. The fruits must be crushed to release the volatile oil. Caraway is also added to food, *e.g.* bread, or boiled in cream (POPOV, 1967).

Seldom employed species are *Pimpinella major* (L.) Huds. and *P. saxifraga* L. (burnet saxifrage). Their root drugs are occasionally mentioned to be galactagogue (cp. ECKSTEIN & FLAMM, 1933, HOCKING, 1955). In the past, magic properties were ascribed to burnet saxifrage. LOSCH (1914) cites "from herbals" that the herb, just being kept at the nursing mother's bosom, causes an enormous flow of milk within six hours, so that it has to be removed. Also the popular opinion that eating salad of celery roots (*Apium graveolens* L. var. *rapaceum* (Mill.) Gaud with turnip-like roots) increases lactation did not prove true.

II. FABACEÆ FAMILY (PAPILIONACEÆ)

Since the Middle Ages herb and seed of *Galega officinalis* L. (common goat's rue) have been used in folk medicine to stimulate milk flow in nursing women as well as in domestic animals. Its generic name is possibly derived from the Greek words "gala" = milk, and "agein" = to drive (SCHUBERT & WAGNER, 1984). Some feeding experiments with cattle occasionally gave a 30-50% increase of milk amount within 24 hours, some were less significant (cp. KÖHLER, 1939, AUSTER & SCHÄFER, 1954). As to human folk medicine, a salad made of fresh leaves was eaten, or the dried herb was infused (SCHULZ, l.c.). In the first half of our century the extract of the drug was employed in pharmacy to produce several galactagogue preparations; a list is given in PEPLAU & SEEL (1941). Clinical studies of a *Galega* preparation (Galegran) showed convincing positive results (TYPL, 1961, HEISS 1968). The increase in milk volume was not due to dilution but concerned also the amount of dry matter. The efficacy of the infusion (0.5-4 g on a cup of water; often combined with fennel and anise) is also verified (KREITMAIR, 1947). The active principle is apparently the content of saponins. WEISS (1985) recommends the harmless tea to nursing mothers, whereas HÄNSEL (1985) points out to possible toxic effects caused by the alkaloid galegin, if the therapeutic dose is not carefully adhered to. He advises against a long-time usage.

Trigonella fœnum-græcum L. (fenugreek), a species of Mediterranean origin, provides a seed drug said to be galactagogue (SIMON *et al.*, l.c.). According to SHARAF & GOMAA (l.c.), the seed oil seems to possess an estrogenic activity. Experiments with lactating rats to find out a "lactation factor" within the oil constituents gave no positive results of fenugreek compared to other oils (cp. BERGER, 1954). *Trigonella* and *Galega* share the property to act slightly insulin-like.

A species common to Central Europe, *Vicia cracca* L. (tufted vetch), is employed not here but in China to stimulate lactation. For this purpose, it is administered in form of a broth cooked with pork and mixed with wine (PERRY, l.c.).

III. VERBENACEÆ FAMILY

This family includes important galactagogues. Folk medicine had used *Verbena officinalis* L. (vervain) as a magic plant for a multitude of purposes since the Middle Ages, one of them to stimulate lactation. The efficacy of this empirical employment was proved by experiments with lactating rabbits (KUWAJIMA, 1939). It was found that the glucoside verbenin (= verbenalin) caused, if applicated intravenously, an increase of milk volume by up to 71%, with the dry matter but hardly diminished. Vervain is probably scarcely used at all in modern times; besides, the species has become quite rare.

An effective galactagogue is obtained from *Vitex agnus-castus* L. (chaste tree, agnus castus, monk's pepper tree), a shrub growing in the Mediterranean region and the Crimea. DIOSCORIDES recommended an extract of crushed fruits in wine to increase the flow of milk. This statement was repeated in the herbals by LONICERUS and MATTHIOLUS (HOPPE,

1969). The Hungarian folk medicine applied the drug to stimulate lactation and cure irregular menstruation (MADAUS, 1938). The active principles of agnus castus are well investigated. A combination of iridoids (aucubin, agnusid), flavonoids (casticin, etc.), and volatile oil have antiestrogenic properties and cause an indirectly luteotropous effect by influencing pituitary gland and diencephalon (ORZECHOWSKI, 1962, KARTNIG, 1986). One commercial preparation of agnus castus is Agnolyt® liquidum (100 g contain extr. fructus agni casti siccum 0.2 g). Several clinical studies of Agnolyt and its precursor Alyt, including about 1000 nursing mothers altogether, document the statistically proven efficacy (JANKE, 1941, HOFMEIER & NOACK, 1942, NOACK, 1943, BAUTZE, 1953, MOHR, 1954). The maximum response to the preparation is reached within two weeks after the beginning of its application. As an early application before delivery may cause galactorrhoea, it is recommended to start taking some days before the expected date of delivery (AMANN & KERRES, 1966). The results of recent studies make it probable that the drug inhibits synthesis and the release of prolactin via dopamine receptors. Seen from this angle, a general positive influence on lactation is questioned and, at most, supposed to be due to local mechanisms or individual dosage (RUDOLF, in A. F., 1992). Thus, a biochemical explanation of the indubitable galactagogue property of agnus castus is still wanting.

IV. URTICACEÆ FAMILY

Several representatives of the *Urticaceae* have a reputation to promote milk secretion. In Europe the common species *Urtica dioica* L. (large stinging nettle) and *U. urens* L. (small nettle, dwarf stinger) have been employed in popular practice. Though this usage is stated in many works on medicinal plants, there are apparently no scientific tests made to verify efficacy. SCHULZ (*l.c.*) cites an older report on a woman who drank an extremely strong decoction of fresh leaves that resulted, beside in several health irritations, in a strong milk secretion lasting for eight days (the last delivery was several years ago). Popular applications of the drug are in the form of an infusion (1 tablespoonful of cut herb on a cup of boiling water let stand for 10-15 min) or some spoonsful of freshly pressed sap per day. The fresh sap has a considerable diuretic property (WEISS, *l.c.*) that could cause an effect on lactation. An application of seed and root drugs is eventually more efficient than that of the herb (KROEBER, 1934). As an infusion, especially when made of dried leaves, seemingly acts not very strongly, a combination with fennel and anise should be preferred.

V. *RANUNCULACEÆ* FAMILY

The seed drugs of the Mediterranean species *Nigella damascena* L. (love-in-a-mist) and *N. sativa* L. (black caraway) have been used to stimulate lactation since the Middle Ages. MATTHIOLUS and BOCK recommended a decoction in wine. There are also galactagogue homeopathic preparations (KROEBER, 1935). An infusion is made of one teaspoonful of seeds on a cup of boiling water let stand covered for 15 min. The empirical efficacy could be due to volatile oil and saponins. The seeds are also utilized as a condiment.

VI. *LAMIACEÆ* FAMILY

The employment of *Ocimum basilicum* L. (sweet basil) as a galactagogue in folk medicine is already documented by MATTHIOLUS. The same indication is listed in some modern works (STEINMETZ, 1959, SCHULZ, *l.c.*, HOCKING, *l.c.*, HOPPE, *l.c.*). The drug, consisting of the dried leaves, is administered in the form of an infusion. The fresh plant contains a volatile oil up to 0.5%; its amount increases during the process of withering and measures up to 1.5% in the drug.

Sometimes the drug obtained from *Majorana hortensis* Moench (sweet marjoram) is said to have a galactagogue property (BERGER, 1952, BÄSSLER, 1955). Its active principle is a volatile oil. As for sweet basil, there is no scientific verification of a possible positive effect.

VII. *MALVACEÆ* FAMILY

WILLFORT (1969) cites "from old herbals" that herb and root of *Malva silvestris* L. (common mallow) and *Malva neglecta* Wallr. (dwarf mallow) were formerly employed in folk medicine to increase breast milk volume. The plant material was cooked in wine; however, it was used in combination with fennel and anise. The latter ingredients are more likely to be responsible for a positive influence on lactation.

A well documented efficacy was displayed by a dry extract from cotton seed meal (species of *Gossypium* L.). This high-protein preparation called "Lactagol" played some role in human as well as veterinary practice in the first half of our century. Feeding experiments on cattle (10-150 g per day) proved a substantial increase in milk amount by 30-60%, concerning also fat and protein contents (BECKMANN, 1903, FENGLER, 1936). A similar positive effect was seen in nursing mothers (BECKMANN, *l.c.*, VARGES, 1905, *cp.* FENGLER, *l.c.*, for further lit.). An amount of 10-12 g of the extract (= 3-4 teaspoonsful) was administered daily. There were no undesirable side effects; a good thriving of the babies was noted. Nevertheless, the clinical utilization of cotton seed extract as a galactagogue abruptly declined. The seeds are eaten by breast-feeding women in South America (WATT & BREYER-BRANDWIJK, 1962) and serve as valuable food rich in proteins in several countries. The seed oil is used for nutrition as well. A toxic phenolic substance, gossypol, which occurs in secretory cells scattered through the cotyledons (YOUNGKEN, 1950) must first be oxidized by the process of boiling. Whether this utilization is correlated with effective lactation has not been documented.

VIII. *POLYGALACEÆ* FAMILY

The generic name "Polygala" occurring already in PLINY's works means "much milk". The genus comprises several species that are said to give rise to strong increase of cow milk yields. Representatives are *Polygala amara* L. (bitter milkwort) and *P. vulgaris* L. (cross-flower). DIOSCORIDES attributes *Polygala* galactagogue properties. BOCK recommends a decoction of the flowers in wine or an application in the form of a cataplasm (HOPPE, *l.c.*). Folk medicine chiefly used bitter milkwort. The whole plant was collected when flowering, dried, and used to prepare an infusion. The drug contains saponins and some volatile oil. Its use in modern times has greatly declined, the quite rare species being of only historical interest.

IX. *CUPRESSACEÆ* FAMILY

The dried, berry-like galbuli of the gymnosperm *Juniperus communis* L. (common juniper tree) ranged among the milk-promoting mixtures used in veterinary practice of the past, though there was no verified efficacy (FRÖHNER, 1946, 1952). POPOV *et al.* (*l.c.*) point out a possible efficacy also in nursing women. A quantity of 10-12 "berries" is infused by a cup of boiling water; 3-4 tablespoonsful are drunk daily. Care should be taken in the case of kidney diseases, as the drug is irritant. A lasting application should be avoided (BÖRNGEN, *l.c.*).

X. RARELY USED GALACTAGOGUES

The crushed seed of *Borago officinalis* L. (borage, *Boraginaceæ* family), drunken in wine, was formerly claimed to act as a galactagogue (LOSCH, *l.c.*, SIMON *et al.*, *l.c.*). In modern times, borage is mainly used as a condiment. It contains saponins that could influence lactation, but also alkaloids that caused liver damage and cancer in laboratory animals (SIMON *et al.*, *l.c.*).

The flower drug of *Sambucus nigra* L. (black elder, *Caprifoliaceæ* family) is very efficient in causing perspiration and is also said to increase the flow of breast milk (LOSCH, *l.c.*, LECLERC, 1954).

In the past, the root of *Tragopogon pratensis* L. (yellow goat's beard, *Asteraceæ* family) was cooked in a meat broth and eaten to promote lactation (LOSCH, *l.c.*). The species belongs to subfamily *Cichorioideae* possessing white latex. The related, common *Taraxacum officinale* Wiggers (dandelion) is used as a galactagogue not here but in China (PERRY, *l.c.*).

Lactation-stimulating properties are ascribed to the unripe fruit of *Phœnix dactylifera* L. (date palm, *Arecaceæ* family) (KAHNT, 1900).

In several countries beer is recommended to be galactagogue (WHO Report, 1985).

XI. NUTRIENTS INFLUENCING LACTATION

High-energy nutrients increase quantity and quality of breast milk, especially in malnourished mothers (JELLIFFE, 1976). Herbal galactagogues added to meat broth can at last partly be counted among such nutrients. Others are mush from barleycorn cooked in milk (WILLFORT, *l.c.*), and gruel (SIEGMUND, 1880). Probably, the same applies to a kind of porridge cooked from the lichen *Cetraria islandica* (L.) Achar. (Iceland moss) that has been utilized in Iceland to promote milk production in pregnant women after delivery (LUDWIG, 1986). Iceland moss is reported to have a strong effect on the milk volume in cattle. BOHN (1913) and KROEBER (1935) recommend the employment of the drug as a nutrient and tonic for breast-feeding mothers.

Summarizing it may be said that herbal galactagogues applied as infusions or decoctions do not act very noticeably. Therefore they should be used for a longer period (several weeks) to develop their full effect. Since lactation is a highly complex process dependent on an intricate combination of hormonal, neural, and psychological factors, differences in efficacy may well be expected as to different women. JELLIFFE & JELLIFFE (1977, cit. after WHO Report, *l.c.*) suggest that part of the effectiveness of many galactagogues comes from the soothing belief that they will work, thus allowing the mother to relax and facilitating the stimulation of the milk-let-down reflex. No matter how breast-feeding is made easier, herbal galactagogues do not deserve to fall into oblivion.

This survey is based on two papers by the author herself (BRÜCKNER, 1989*a*, *b*).

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