Research

Ethnoveterinary medicines used for horses in Trinidad and in British Columbia, Canada
Cheryl Lans*, Nancy Turner1, Gerhard Brauer2, Grant Lourenco3 and Karla Georges4

Address: 1University of Victoria, Environmental Science, British Columbia, V8W 3P5, Canada, 2University of Victoria, Health Information Science, British Columbia, V8W 3P5, Canada, 3c/o Trinidad and Tobago Racing Authority, Santa Rosa Park, Churchill Roosevelt Highway, O’Meara, Arima, Trinidad and Tobago and 4School of Veterinary Medicine, Faculty of Medical Sciences, University of the West Indies, Mt. Hope, Trinidad and Tobago

Email: Cheryl Lans* - trini@uvic.ca; Nancy Turner - nturner@uvic.ca; Gerhard Brauer - gwbrauer@uvic.ca; Grant Lourenco - raceclub@cablenet.net; Karla Georges - georgesk@tstt.net.tt
* Corresponding author

Abstract
This paper investigates the commonalities in ethnoveterinary medicine used for horses between Trinidad (West Indies) and British Columbia (Canada). These research areas are part of a common market in pharmaceuticals and are both involved in the North American racing circuit. There has been very little research conducted on medicinal plants used for horses although their use is widespread. The data on ethnoveterinary medicines used for horses was obtained through key informant interviews with horse owners, trainers, breeders, jockeys, grooms and animal care specialists in two research areas: Trinidad and British Columbia (BC). A participatory validation workshop was held in BC. An extensive literature review and botanical identification of the plants was also done. In all, 20 plants were found to be used in treating racehorses in Trinidad and 97 in BC. Of these the most-evidently effective plants 19 of the plants used in Trinidad and 66 of those used in BC are described and evaluated in this paper. Aloe vera, Curcuma longa and Ricinus communis are used in both research areas. More research is needed in Trinidad to identify plants that respondents claimed were used in the past. Far more studies have been conducted on the temperate and Chinese medicinal plants used in BC and therefore these ethnoveterinary remedies reflect stronger evidence of efficacy.

Background
Trinidad and Tobago is located northeast of the Venezuelan coast and has a humid tropical climate. British Columbia (BC) is the western-most province in Canada and has a temperate climate. This paper describes a selection of the ethnoveterinary medicines used for horses in Trinidad and Tobago and in British Columbia. These places are part of a common market in pharmaceuticals and are both involved in the North American horse racing circuit. Since racehorses and jockeys are often in transition from other regions and between Canada (including Woodbine racetrack in Ontario, the Aqueduct racetrack and Belmont Park, both in New York) and the Caribbean, one of the goals of this research was to investigate commonalities in ethnoveterinary medicine between these two regions. Very little research has been conducted on ethnoveterinary medicine used for horses and there are few comparative studies. There are some shared cultural features...
between Canada and the Caribbean derived from common Amerindian culture, British colonial histories, and substantial and continuous migration from the Caribbean to North America. An estimated 150,000 Trinidadians are currently living in Canada.

The population of Trinidad, just over 1 million people has equal proportions of African-origin and East Indian-origin (39%). Approximately 15% of the population consists of mixed raced persons and the remainder consists of minority groups (>2%) of European-origin, Middle-Eastern-origin and Chinese-origin people. British Columbia has a total population of 4.168 million people. The 1996 census revealed that 50% of the population was of European origin and 27% of Asian origin. The population of Chinese origin is estimated at 253,382. The 2001 Census revealed that the top 10 languages spoken in BC are: English, Chinese (including Cantonese and Mandarin), Punjabi, then five Western European languages, Tagalog and Korean.

There are major differences in vegetation between the two areas. However a few studies have revealed that geographical barriers are lessening in terms of increasingly globalized ethnopharmacology. For example, one study conducted south of Trinidad revealed that of 216 introduced plant species used by peoples in northern South America (Brazil, Colombia, Ecuador and Peru), 80% were of European, Mediterranean or Asian origin, 9% were of African origin and 8% were from the New World [1]. Another researcher found that 36% of the taxa used in the Atlantic forests of Bahia, Brazil for which origins could be established came from Africa, Asia and Europe [2]. The plant pharmacopoeia in South America is cultivated, exotic and opportunistic and sourced from home gardens, roadsides and secondary forest rather than indigenous species from the primary forests that were alien to the region's new settlers [2]. Canadians use a wealth of herbs of European origin. However research conducted by the first author in both countries indicates that there are far more herbs of Chinese origin being used in Canada than there are in Trinidad and Tobago [3,4]. We will return to this point later in the paper.

Horse racing has been established in Trinidad since 1828 [5]. There are occasional race days as well on the twin island of Tobago. The only utilised racetrack in Trinidad was moved from the capital city (Port of Spain), east to the refurbished venue at the Santa Rosa Complex (73 hectares) in Arima in 1993. Previously, all races were run on a clockwise turf track. However due to the influence of American-style racing, an anti-clockwise sand track surface circuit was laid. Race distances vary from 350 metres (for 2-year-olds) to 2000 meters. The Santa Rosa Complex hosts 40 race days annually. The Trinidad and Tobago Racing Authority is the body responsible for horse racing. There are several associations associated with horse racing: the Owners, the Stud Farm, the Bookmakers, Grooms and Trainers Associations, the Arima Race Club and the Tobago Race Club. The government Minister in charge of horse racing in 1999 claimed it was not economically viable and relied heavily on government financial support [6]. Creoles (locally born horses) from Trinidad also race in Puerto Rico, Barbados and Jamaica. In the 2004 Agricultural Census conducted by the Ministry of Planning and Development, the Ministry of Agriculture, Lands and Marine Resources and the Central Statistical Office, horses were not counted and therefore data on the horse industry is limited.

The research area in British Columbia consisted of the Lower Mainland, the Thompson/Okanagan region and south Vancouver Island. The racetrack situated in the research area is Hastings Park, in Vancouver, the largest city in the province. The 2001 Statistics Canada Census revealed that there were 53,366 horses and ponies living on 6,820 farms in BC. The horse industry in 2001 was primarily located in the Thompson Okanagan (25%), the Lower Mainland (20%), the Peace River (18%), and lastly 15% in the Cariboo region. A typical horse unit has seven mares on 10–70 acres. The horse racing industry includes between 9,000 and 10,000 horses, generates $198 million annually and creates 4,000 jobs; but horse racing constitutes only 18% of the horse economic sector [7]. Other parts of the sector include recreational and trail riding, competitions, companionship and other kinds of working animals. The total economic activity involving horses in BC contributed 771 million dollars.

**Data collection**

Data collection in Trinidad took place in 2000, with further work conducted in 2003. Data collection in BC was carried out in 2003. The respondents were ethnically and demographically varied. A selection of both sets of ethnoveterinary remedies is evaluated in the discussion section of the paper using a non-experimental validation method. The Trinidad component of this study was derived from a larger research project on ethnoveterinary medicines used in Trinidad and Tobago [4]. This previous study revealed that the main outcome or synergy in folk medicine is that all the knowledge is available to all ethnic groups in a kind of ‘melting pot’ and that there are no rigid barriers preventing the spread of knowledge between the various ethnic groups. In order to gain access to the study population the authors worked through previously known individuals and from previously existing social networks in building a snowball sample and hence a network of interviewees [8]. The first contact relating to this study was a race-horse owner (#8 top earner for the period 1994 to 2000); she drove the first author to the initial visit
to the racetrack and to the broodmare farm where her horses were kept. She also introduced the author to several of the trainers. When respondents in the horse racing industry were contacted subsequently it was discovered that they already knew about the research from the initial contact.

Interviews in Trinidad took place from July to September 2000 (CL) and in 2003 (KG). The interviews conducted in Trinidad in 2003 reassessed the initial data (a form of triangulation). The research was facilitated by community-based contacts and occupationally based contacts obtained from newspapers. This networking approach was necessary because there is no sampling frame of persons involved in ethnoveterinary medicine in Trinidad. It produced the desired purposive sample of key respondents.

Four visits were made to the sole racetrack; one of these was on a race day. One visit each was made to three of the six brood mare farms in Trinidad, located in North, East and Central Trinidad. At the racetrack, ten trainers and two assistant trainers were interviewed and one retired trainer was interviewed by phone (this sample is one-tenth of all trainers in Trinidad). The sample frame for choosing the trainers was obtained from the sports pages of the three daily newspapers and from the statistics kept at the University of the West Indies library. All of the interviews were unstructured and open-ended. One of the trainers was also a practising veterinarian. Seven of the ten trainers are recorded in the statistics kept on the "top 25" winners (1994–2000) (#3, #4, #6, #7, #9, #14, #18).

Of all of the trainers interviewed two used no ethnoveterinary medicines, 25% were active users while others reported past use in the 1970s or what they had observed others using. Four grooms were interviewed; they were current users of ethnoveterinary medicines. Six owners/breeders or their representatives were interviewed in 2000, two of them by phone. Four were ranked among the "top 25" in winnings (1994 – 1998) (#1, #7, #8, #12); only one used ethnoveterinary medicines. Three of the six veterinarians consistently working with horses were interviewed, two reported their knowledge of ethnoveterinary medicines, one was also a trainer as indicated above, the other a former jockey.

In 2003, four trainers were interviewed (one by phone). One was selected to confirm the previous data; two were interviewed in 2000, but independently selected in 2003; one was new. Additionally a groom, a stable lad, an assistant trainer, a jockey and a recently graduated veterinarian were interviewed.

Ethnoveterinary data for British Columbia was collected over a six-month period in 2003. All available literature about livestock farmers and the secondary literature on ethnomedicinal plants, folk medicine and related fields in British Columbia was reviewed.

A purposive sample of livestock farmers was necessary to target key informants with the knowledge sought. The sample size was 60. The sample was obtained from membership lists of organic farmers, horse breeders and trainers, horse stables, other specialists in alternative medicine and holistic veterinarians.

Interviewees comprised one naturopath, four horse breeders/trainers, two herbalists, one farmer and one headmistress with horses at her school (for girls). All of the respondents used herbal medicines for horses. Two visits were made to each farm or respondent, and to the Hastings racecourse in Vancouver. All of the interviews at the initial stage were open-ended and unstructured. A draft outline of the respondents' ethnoveterinary remedies was delivered and discussed at the second visit in order to confirm the information provided at the first interview. Medicinal plant voucher specimens were collected where possible and were identified and deposited in the University of Victoria herbarium (V).

The plant-based remedies were evaluated for safety and efficacy with a non-experimental method, prior to including them in the draft outline. Published sources such as journal articles and books on pharmacology and ethnomedicine available on the Internet were searched to identify the plants' chemical compounds and clinically tested physiological effects. This data was incorporated with data on the reported folk uses, and their preparation and administration in North America and Europe. For each species or genus the ethnomedicinal uses in other countries are given; followed by a summary of chemical constituents, in addition to active compounds if known. This type of ethnopharmacological review and evaluation is based on previous work and the use of these methods in a previous research study has been published [4,9-11]. The non-experimental validation of the plants is presented in the discussion section of the paper.

Validation workshop
Ten participants with experience in traditional human and ethnoveterinary medicine took part in a participatory five-day-long workshop at the University of Victoria (BC), in October, 2003. In the workshop the facilitator asked participants very specific questions in a supportive environment about the medicinal plants used. Each animal/livestock species was covered in a morning or afternoon session [4,11]. At the horse session the four participants (two horse trainers and two herbalists), introduced them-
selves and their work and were instructed on the participatory workshop method. The participants discussed the previously produced horse section of the data. There were two editorial assistants/facilitators in attendance. After the discussions, the horse section was edited. In addition, two herbalists in Port Alberni were visited by the ethnoveterinary consultant and the researcher (CL) and the edited horse data was discussed with them. One trainer with horses at the Hastings racecourse visited the researcher after the workshop and discussed the workshop-edited horse data with the researcher and the ethnoveterinary consultant.

**Non-experimental validation of ethnoveterinary remedies**
The researcher and the ethnoveterinary consultant completed the non-experimental validation of the remedies in advance of the workshop. A low-cost, non-experimental method was used to evaluate the potential efficacy of the ethnoveterinary remedies [9-11]. This method consisted of:

- obtaining an accurate botanical identification of the herbal remedies reported;
- searching the pharmaceutical/pharmacological literature for the plant's identified chemical constituents in order to determine the known physiological effects of either the crude plant drug, related species, or isolated chemical compounds that the plant is known to contain. This information was then used to assess whether the plant use is based on empirically verifiable principles.

Supporting ethnobotanical data and pharmacological information was matched with the recorded folk use of the plant species [12-18], to determine degrees of confidence about its effectiveness. Four levels of confidence were established:

1. Minimal level: If no information supports the use it indicates that the plant may be inactive.

2. Low level: A plant (or closely related species of the same genus), which is used in distinct areas in the treatment of similar illnesses (humans or preferably animals), attains the lowest level of validity, if no further phytochemical or pharmacological information validates the popular use. Use in other areas increases the likelihood that the plant is efficacious.

3. Mid level: If in addition to the ethnobotanical data, available phytochemical or pharmacological information is consistent with the use, this indicates a higher level of confidence that the plant may exert a physiological action on the patient.

4. High level: If both ethnobotanical and pharmacological data are consistent with the folk use of the plant, its use is classed in the highest level of validity and is considered efficacious.

**Results**
In all, 20 plants were found to be used in treating racehorses in Trinidad and 97 were used in BC. Of these seven of the most evidently effective plants used in Trinidad and 33 of those used in BC are described and evaluated in this paper. In BC eighteen plants were used for wounds and abscesses and ten plants were used for anxiety and nervousness. The next largest group of plants (7) were used for hormone imbalances. This last category of treatment was not described in Trinidad. *Aloe vera, Pulmonaria officinalis* and *Medicago sativa* were reported to be used for exercise induced pulmonary haemorrhage. *Aloe vera, Curcuma longa* and *Ricinus communis* were used in both research areas but for different ailments.

**Ethnoveterinary remedies used in Trinidad**
The ethnoveterinary usages of locally available plants for horses in Trinidad are summarised in Table 1. Twenty plants are used.

**Plants used for diarrhoea**
Guava (*Psidium guajava*) leaves, young fruits and/or buds were boiled and mixed with mash or bran or a combination of both and given to the horse to eat by three respondents after orthodox treatments had been tried. One respondent used young green fruit of the banana (*Musa* sp.) including skins once for one horse. The banana fruit was boiled, crushed and mixed with the mash and this was given to the horse to eat. Another respondent used carrots (*Daucus carota*) (eight kg). One respondent reported a one-time use of stale cow dung, which was pushed down the horse’s throat in order to obtain beneficial bacteria. This practice of using cow dung was confirmed by another respondent.

**Plants used for tendonitis**
Medicinal plants for tendonitis were preferred by those who believe that horses don’t have much circulation from the knee down; therefore ice is seen to be of no value for swelling. One respondent claimed that treatment was based on the stage of injury. He believed that the herbal remedies were more effective in the first stages of injury and stressed that rest was the most important factor for the recovery process.

Tendon and ligament problems were described as the second biggest affliction after respiratory problems. Horses with sprained tendons or ligaments have joints of rachette (*Nopalea cochenillifera*) applied directly to the injured area. The mucilage obtained from inside the rachette joints may
be mixed with flour and or Epsom salts. Two respondents practiced tendon splitting, or splitting of the affected suspensory ligament and the flexor tendon into the normal tissue above and below the lesion. Respondents do this to increase circulation to the affected area and thus enhance the healing process. Castor bean leaves (Ricinus communis) were quickly passed over a flame, and wrapped around the clay already placed on the injured tendon, which was then left to heal. Joints of rachette (Nopalea cochenillifera) were split open, mixed with aloes (Aloe vera) or clay, and packed on to the tendon. This poultice was said to help with the healing process and to keep "heat" from the damaged tissue or injured joint out of the tendon. Alternatively, leaves of wonder of world (Kalanchoe pinnata) were used to remove the "heat" from the injured leg. Wonder of world is claimed to have antiinflammatory properties. The rest of the treatment consists of rest and those trainers who believe that using ice has value use an ice pack to completely cover the leg.

Three interviewees blister flexor tendons or suspensory ligaments to help the healing process. The method consists of rubbing the tendon with iodine or mercuric iodine on a toothbrush for three days. This practice is stopped for three days and then another cycle is started. After the raw scab comes off, aloes (Aloe vera) is applied to help the tissues and skin heal. Blistering agents' remove the hairs from the injured part, there is localised swelling, the skin sloughs off and subcutaneous necrosis can also occur. Blistering necessitates rest since a long healing period is required. Horses were not blistered above the knee. The iodine is said to act as a counter irritant, which brings blood to damaged part, and the increased circulation enhances the healing process.

Bucked shins were described as an injury in the forelimb of young horses after exercise and were also blistered. There is periostitis of the plantar surface of the third metacarpal (or metatarsal) bone. Horses with tendon injuries were also taken to the sea for exercise to take the weight off the legs. Alternatively the injured leg is placed in brine from salted pigtails; both practices were said to harden the tendon. This remedy is thought to be over 30 years old. Aloes (Aloe vera) was also used for soreness in horses' joints, the gel is made into a paste, applied and then the joint is bandaged.

Poultices were made with river clay or white clay. Some buy the clay already prepared while others do their own preparation. Other poultices were made with a combination of clay, washing soap (hard bar) and glycerine and Epsom salts. The clay keeps the horses legs cool. Poultices were sometimes made with a combination of aloes, rachette, glycerine and Epsom salts, and were said to have a "drawing" effect.

Young castor bean leaves (Ricinus communis) or two to three young almond leaves were warmed and the veins were crushed (n.b. Trinidad almond is Terminalia catappa, this plant was identified from the literature). These leaves were put on minor injuries and bandaged. It is said that oil runs out of Ricinus communis leaves and cools the "heat" or swelling in the leg. Horses with bad tendon injuries were treated with rachette and aloes. This particular

Table 1: Ethnoveterinary medicines used for horses in Trinidad and Tobago

| Scientific name                  | Family           | Common Name | Plant part used | Use                                         |
|----------------------------------|------------------|-------------|-----------------|---------------------------------------------|
| Aloe vera                        | Liliaceae        | Aloes       | Leaf gel        | anhydrosis, Retained placenta, Tendon problems |
| Capsicum annuum L., Capsicum frutescens | Solanaceae   | pepper      | leaf            | Anhydrosis                                  |
| Cecropia peltata                 | Cactaceae        | Bois canôt  | Leaf            | Anhydrosis, Kidney problems                 |
| Cordia curassavica               | Boraginaceae     | Black sage  | Leafy branch    | Grooming                                    |
| Curcuma longa                    | Zingiberaceae    | Turmeric    | Rhizome         | Retained placenta                           |
| Desmodium sp.                    | Fabaceae         | Speedweed   | Enhance performance |                                     |
| Momordica charantia              | Cucurbitaceae    | Carasali   | Vine            | Tonic, blood purifier, skin rashes          |
| Musa species                     | Fabaceae         | Cow itch    | Leafy branch    | Enhance performance                         |
| Nasturtium officinale            | Brassicaceae     | Watercress  | Leaf            | Increase blood count                        |
| Nopalea cochenillifera           | Cactaceae        | Rachette    | Joint           | Diaphoretic, tendon problems                |
| Oxalis corniculata               | Oxalidaceae      | Speedweed   | Enhance performance |                                     |
| Panicum maximum*                 | Poaceae          | Wiz/Guinea grass | Leaf       | Grooming                                    |
| Pimenta racemosa                 | Myrtaceae        | Bay leaves  | Leaf            | Diaphoretic                                 |
| Psidium guajava                  | Myrtaceae        | Guava       | Leaf, bud       | Diarrhoea                                   |
| Pueraria phaseoloides            | Fabaceae         | Kudzu       | Leaf            | High protein feed                           |
| Ricinus communis                 | Fabaceae         | Castor bean leaf | Leaf        | Tendon problems                             |
| Stachytarpheta jamaicensis       | Verbenaceae      | Vervine     | Leaf            | High protein feed                           |

*Respondent identification was not confirmed.
treatment is called "sweating it down." The plants were grated and packed on the leg. In terms of dosages all respondents used sufficient plant material to cover the area being treated. The leg is then wrapped with a football sock that has had the toe cut off. The sock is then tied at the bottom. The plants were thus packed inside the sock. The sock is then wrapped with a bandage to keep it in place. An alternative treatment is to put aloes on first, then wrap a heated bois canôt (Cecropia peltata) leaf on the leg, which is then bandaged with cotton. This practice is repeated for a few months. Trainers also rub a decoction of bay leaves (Pimenta racemosa), indigo blue and a scent like lavender (owner preference for scent) on their horses' sore muscles and quarters.

Plants used for grooming
Wiz is the horse racing term for a ball of dried plant material used for grooming. A wiz may be made up of wild carailli leaves (Momordica charantia) elephant or guinea grass (Panicum maximum) or wild senna leaves (Senna alata). A bundle of this dry grass (the plant tops) was beaten on a wall and stripped thin. It was then rolled into a ball and placed in the sun to dry. A wiz was best if left to age. This matted bundle was then rubbed on the horses' skin and was said to make the skin shiny. A wiz was used only on a clean horse. A bundle of branch tips of black sage (Cordia curassavica) (also called shining bush in the horse racing industry) was used before horses race to make the horse's coat shiny, as a coat cleaner and to remove the superficial dust. The dust from the horse's skin turns the bunch of leaves brown. A wet horse may be rubbed with wild carailli or wild senna leaves to cool them. Coconut oil (Cocos nucifera) was also used to make the coat shine. One respondent used carailli to treat rashes. The carailli vine was boiled and the water was then used to sponge the horse.

Plants used for hoof problems and other injuries
Wonder of the world (Kalanchoe pinnata), young banana leaves (Musa species), or castor bean leaves (Ricinus communis) were rolled with a bottle to burst the plant veins. The leaves were then passed quickly over a flame to warm them. Soft candle (whale fat) and Epsom salts were pasted on and the leaves were then placed on top. The whole thing was then wrapped with vet wrap or Elastoplast®. Alternatively turmeric root (Curcuma longa) was pounded and used. The entire foot was then placed in a bag or bandaged for three or four days and "sweated" for as long as it took to draw the inflammation out. This practice was used to draw infections out of injuries such as bruises from stones below the hoof. For cuts, aloes (Aloe vera) was bandaged on for two to three days.

Plants used as anthelmintics
Worm grass (Chenopodium ambrosioides) was used as an anthelmintic, but less so than in the past. The very infrequently used leucaena (Leucaena leucocephala) was said to make hairs from the horses' tail drop off.

Plants used for enhanced performance
Horse's hind quarters were occasionally rubbed with cow itch (Mucuna pruriens), this was said to help them come out of the boxes faster, since the plant acts as an irritant. Bay leaf (Pimenta racemosa) was used to bathe horses on race day, this was said to carry heat into body, which makes them run faster to get away from the sun's heat. Two plants called speedweed (Oxalis corniculata and Desmodium sp.) were used to enhance performance. The plants were fed to horses with the rest of their feed, not given specifically before a race.

Plants used for anhydrosis
If the horse did not seem to be sweating, or was dry coated, Aloe vera or two bois canôt leaves (Cecropia peltata) or grated rachette (Nopalea cochenillifera) was mixed with water and administered as a drench. Pepper leaves (Capsicum annuum, Capsicum frutescens) may also be used. It was thought that this "heats" the horse which makes it drink more water. These practices were said to "cool down" the horse's system and bring out the "heat", the animal sweats a few hours later. In previous times horses were taken to the river to stand up in the water for an hour after the race. Rachette (Nopalea cochenillifera) joints were pounded up, put in water, and given to horses to drink, they "sweat it out" and this helps them reduce their temperature. Horses were also bathed with bay leaves (Pimenta racemosa) to make them feel cool. A decoction of one or two cups of bay leaves was added to a half bucket of water, this liquid was then used to sponge the horse. Alternatively they were sponged with bay rum. Bay rum is a mixture of bay oil extracted from leaves of Pimenta racemosa, alcohol and water.

Plants used for retained placenta
Horses with retained placenta were seen to have a black discharge three days post partum. These horses were given a 7.5 cm piece of aloes (Aloe vera) each day for three days, and then purged with castor oil (Ricinus communis). One respondent used linseed oil mixed with aloe vera gel twice weekly. About half of a large leaf of Aloe vera was used. Another respondent used pounded turmeric rhizome (Curcuma longa). Turmeric was said to flush out the uterus. Horses were also given molasses water to drink, this was said to "clean them out." Horses were also given a combination of glycerine, Epsom salts and rachette (Nopalea cochenillifera) to treat inflammation.
Plants used for digestive problems
Aloes (Aloe vera) was boiled for five minutes and mixed with linseed oil. This was syringed down the horse's throat; some spit it out. Aloes was used for most internal problems and it was said to ease digestive problems. Subsequent to the administration of the Aloe vera the horse was given a purge with castor oil (Ricinus communis). Aloes leaves were also peeled and blended with water; this mixture was then combined with honey, and given orally with a syringe. A decoction of caraaili (Momordica charantia) vine was given orally as a digestive aid.

Plants used for bleeds – exercise induced pulmonary haemorrhage (EIPH)
Horses that collect blood in their lungs during or after a race were called "bleeders" (exercise induced pulmonary haemorrhage). To treat bleeders, honey and aloes were given orally. Sometimes the white of an egg was included. Additionally, pureed lemon juice was syringed into the horse's nostrils, this was said to curb bleeding by acting as an astringent. Watercress (Nasturtium officinale) was put in horses' food to "increase their blood count." Vervine (Stachytarpheta jamaicensis) and kudzu (Pueraria phaseoloides) plant tops were fed as high protein feeds.

Plants used for urinary problems
A decoction of bois canôt (Cecropia peltata) leaves was given as the drinking water. One respondent remembered seeing a veterinarian use the long stem of a pawpaw leaf (Carica papaya) as a catheter to clear a urinary blockage. To stimulate diuresis a decoction of the dry leaves of bois canôt (Cecropia peltata) was prepared in a bucket; a cup of this liquid in then put in the horses' drinking water. This was thought to assist in "cleaning out the bladder" of the horse.

Plants used for respiratory conditions
For bad head colds, horses were sweated or syringed with a cough medicine made of honey, garlic, and onion and boiled bois canôt leaves (Cecropia peltata). To "sweat" the horse, heated bricks from a dirt oven were put into a bucket with Vicks, peppermint oil or Foyles Balsam®. The horse's head was put in the bag, and the horse forced to inhale the steam.

Ethnoveterinary remedies used in BC
The ethnoveterinary usages of locally available plants for horses in British Columbia are summarised in Table 2.

Plants used for abscesses and wounds
Slippery elm (Ulmus rubra, U. fulva) inner bark powder was placed on a plantain leaf (Plantago major), with the addition of kelp or powdered myrrh (Commiphora molmol) (without the resin). Hot castor oil (Ricinus communis) packs were also used for abscesses. An external treatment for abscesses consisted of a wash of comfrey tea (Symphytum officinalis). This tea could include an infusion of Oregon grape (Mahonia aquifolium).

A complementary internal treatment included equal parts of powdered Echinacea (Echinacea angustifolia or Echinacea purpurea or Echinacea pallida), (leaves and flowers) and elecampane (Inula helenium) (leaves and flowers), either mixed once a day with the food, or administered as a tea was added to the water for several weeks after completion of the external abscess treatment.

Tea tree (Melaleuca alternifolia) oil was used as a disinfectant (undiluted). Compresses were made of powdered aerial parts of betony (Stachys officinalis), figwort (Scrophularia nodosa) and motherwort (Leonurus cardiaca). Comfrey (Symphytum officinalis) root was added. Equal amounts of the herbs were made into a paste with water, applied onto a gauze pad and placed onto the wound. Myrrh gum (Commiphora myrrha) was used for wounds. Woundwort (Prunella vulgaris) aerial parts were ground into a paste with calendula (Calendula officinalis) flowers. Three parts slippery elm (Ulmus fulva) bark powder was mixed with hot water and one part myrrh powder (Commiphora myrrha) and was given for pain. To stop the bleeding from a large cut or tear kitchen flour was applied, the wound was bandaged tightly then the horse was taken to the veterinarian. One or two leaves of comfrey were crushed and applied to cracks on the hoof and then bandaged. Undiluted tea tree oil was put directly on abscesses of the hoof and wrapped, or a pure commercial Aloe vera product was used.

Plants used for anxiety
Plants fed to alleviate anxiety in horses included leaves of magnolia (Magnolia acuminata) and (fresh or dried) flowers of passion flower (Passiflora incarnata). Alternatively, lavender tea (Lavandula sp.) or tincture was given in one bucket of water or placed on the feed. For nervousness and restlessness a handful of flowers of chamomile (Matricaria recutita, Matricaria chamomilla) or the content of a chamomile tea bag was added to the main meal. One or 2 tbsp valerian (Valeriana officinalis) ground root was given to a horse that froze in stressful situations. One tsp of combined equal amounts of powdered valerian, hops (Humulus lupulus) and skullcap (Scutellaria lateriflora) was put into the feed, twice a day. Valerian use was stopped 48 hours before a race so that it would not be present in the blood at race time.

Plants used for arthritis and sore joints
Powders of the following plants were added to the feed: turmeric (Curcuma longa); aerial parts of horsetail (Equisetum arvense) (silica content); aerial parts of baical skullcap (Scutellaria baicalensis) (inflammation, sedative) and lav-
Table 2: Ethnoveterinary medicines used for horses in British Columbia

| Scientific name                  | Family       | Common name | Plant part used | Use                                      |
|----------------------------------|--------------|-------------|-----------------|------------------------------------------|
| *Achillea millefolium*           | Asteraceae   | yarrow      | dried aerial parts | fever                                    |
| *Alchemilla vulgaris*            | Rosaceae     | lady’s mantle | leaves        | hormone imbalances                        |
| *Allium sativum*                 | Liliaceae    | garlic      | cloves          | respiratory problems                      |
| *Aloe vera*                      | Liliaceae    | aloe vera   | leaf gel       | hoof abscess, skin problems               |
| *Althea officinalis*             | Malvaceae    | marshmallow | aerial parts    | demulcent for devil’s claw, prevent colic |
| *Althea sp.*                     | Malvaceae    | mallow      | aerial parts    | counteract Lasix                          |
| *Arctium lappa*                  | Asteraceae   | burdock     | root            | arthritis                                 |
| *Arctostaphylos uva-ursi*        | Ericaceae    | uva-ursi    | aerial parts    | bladder infections                        |
| *Artemisia sp.*                  | Asteraceae   | wormwood    | aerial parts    | endoparasites                             |
| *Astragalus membranaceus*        | Fabaceae     | astragalus  | leaves          | recovery                                  |
| *Barosma betulina* and *B. crenulata* | Rutaceae       | buchu      | leaves          | kidney tonic                              |
| *Berberis aquifolium*            | Berberidaceae| Oregon grape| root            | abscesses                                 |
| *Calendula officinalis*          | Asteraceae   | calendula   | infused flower oil & sulphur | front fetlock irritation |
| *Calendula officinalis*          | Asteraceae   | calendula   | root            | ringworm                                  |
| *Calendula officinalis*          | Asteraceae   | calendula   | flowers         | eye problems, grass rash, sunburn, wounds |
| *Capsella bursa-pastoris*        | Brassicaceae | shepherd’s purse | aerial parts   | skin rash, skin problems                  |
| *Capsicum sp.*                   | Solanaceae   | cayenne     | fruits          | joint pain                                |
| *Chichorium intybus*             | Asteraceae   | chicory     | aerial parts    | stomach problems                          |
| *Coffee arabica*                 | Rubiaceae    | coffee      | roasted seeds   | tonic                                     |
| *Commiphora molmol*              | Burseraceae  | myrrh       | resin, gum      | abscesses, wounds                         |
| *Crataegus oxyacantha*           | Rosaceae     | hawthorn    | berries, leaves or flowers | heart tonic |
| *Cucurbita pepo*                 | Cucurbitaceae| pumpkin     | fruit flesh and seed | tapeworms                              |
| *Curcuma longa*                  | Zingiberaceae| turmeric    | rhizome         | arthritis                                 |
| *Daucus carota*                  | Apiaceae     | carrot      | grated root     | pinworms                                  |
| *Echeveria elegans*              | Crassulaceae | hen and chicks | leaves     | hoof abscess                             |
| *Echinacea angustifolia, E. purpurea, E. pallida* | Asteraceae   | echinacea   | leaves and flowers | abscesses                               |
| *Equisetum arvense*              | Equisetaceae | horsetail   | aerial parts    | arthritis                                 |
| *Euphrasia officinalis*          | Scrophulariaceae | eyebright | leaves          | eye problems                              |

ender (*Lavandula* sp.) flowers. A tea made of licorice root (*Glycyrrhiza glabra*) (synergistic effect). Prickly ash bark/toothache tree (*Zanthoxylum americanum*).
| Plant Name                     | Family      | Part Used     | Use                      |
|-------------------------------|-------------|---------------|--------------------------|
| *Filipendula ulmaria*         | Rosaceae    | whole plant   | arthritis                |
| *Rosaceae*                    |             | dried aerial parts | Fever, blood thinner   |
| *Fragaria virginiana*         | Rosaceae    | leaf          | hormone imbalances       |
| *Galium sp.*                  | Rubiaceae   | aerial parts  | grass colic              |
| *Glycyrrhiza glabra*          | Fabaceae    | root          | arthritis, counteract Lasix, prevent colic, muscle soreness, synergy |
| *Harpagophytum procumbens*    | Pedaliaceae | root          | arthritis                |
| *Humulus lupulus*             | Cannabaceae | hops          | prevent colic, nerves, sedative |
| *Hypericum perforatum*        | Hypericaceae| flowers       | abscesses                |
| *Hyssopus officinalis*        | Lamiaceae   | aerial parts  | heart tonic              |
| *Inula helenium*              | Asteraceae  | aerial parts  | abscesses, endoparasites, respiratory problems |
| *Laminaria sp.*, *Fucus sp.*  | Laminariaceae, Fucaceae | leaf | abscesses |
| *Lavandula augustifolia*      | Lamiaceae   | aerial parts  | soother                  |
| *Lavendula sp.*               | Labiatae    | flowers       | anxiety, arthritis       |
| *Leonurus cardiaca*           | Lamiaceae   | aerial parts  | wounds                   |
| *Magnolia acuminata*          | Magnoliaceae| leaves        | anxiety                  |
| *Malva sp.*                   | Malvaceae   | aerial parts  | respiratory problems     |
| *Matricaria chamomilla*       | Asteraceae  | aerial parts  | eye problems             |
| *Matricaria recutita*         | Asteraceae  | flowers       | prevent colic, hormone imbalances, muscle soreness, nervousness, stomach acid |
| *Medicago sativa*             | Fabaceae    | hay           | bleeder                  |
| *Melaleuca alternifolia*      | Myrtaceae   | oil           | hoof abscess, wounds     |
| *Mentha piperita*             | Lamiaceae   | peppermint    | intestinal problems, stomach acid |
| *Oenothera biennis*           | Onagraceae  | flowers       | hormone imbalances       |
| *Passiflora incarnata*        | Passifloraceae | aerial parts | hormone imbalances       |
| *Passiflora incarnata*        | Passifloraceae | flowers | anxiety |
| *Petroselinum crispum*        | Apiaceae    | aerial parts  | urinary cleanser         |
| *Plantago major*              | Plantaginaceae | leaf | abscesses, skin rashes |
| *Prunella vulgaris*           | Lamiaceae   | aerial parts  | wounds                   |
| *Pulmonaria officinalis*      | Boraginaceae | aerial parts  | bleeder                  |
| *Ricinus communis*            | Euphorbiaceae | castor bean | oil                      |
| *Rubus idaeus*                | Rosaceae    | leaves        | pregnancy                |

Table 2: Ethnoveterinary medicines used for horses in British Columbia (Continued)
Table 2: Ethnoveterinary medicines used for horses in British Columbia (Continued)

| Plant Name                | Family      | Part Used          | Action(s)                                      |
|---------------------------|-------------|--------------------|------------------------------------------------|
| Rubus ursinus             | Rosaceae    | trailing wild      | prevent colic                                  |
|                           |             | blackberry leaves  |                                                |
| Rumex crispus             | Polygonaceae| yellow dock leaves | skin rash                                      |
| Salix alba                | Salicaceae  | white willow bark  | arthritis, stomach lining, muscle soreness     |
| Salix alba                | Salicaceae  | white willow bark and/or leaf | fever |
| Salvia sp.                | Lamiaceae   | red sage leaves    | tonic                                          |
| Scrophularia nodosa       | Scrophulariaceae | figwort aerial parts | wounds                                         |
| Scutellaria baicalensis   | Lamiaceae   | baikal skullcap aerial parts, leaves | arthritis, skin rash |
| Scutellaria lateriflora   | Lamiaceae   | skullcap aerial parts, leaves | revive gut flora, pain, nervousness |
| Silphium marianum         | Asteraceae  | Milk thistle seed  | arthritis, reduce blood pressure               |
| Stachys officinalis syn         | Lamiaceae | betony aerial parts | wounds, prevent colic |
| Stellaria media           | Caryophyllaceae | chickweed aerial parts | skin problems                                |
| Symphytum officinalis     | Boraginaceae| comfrey root       | counteract Lasix                               |
| Symphytum officinalis     | Boraginaceae| comfrey leaves     | eye problems, abscess, hoof crack              |
| Symphytum officinalis     | Boraginaceae| comfrey root       | wounds                                         |
| Tanacetum parthenium      | Asteraceae  | feverfew dried aerial parts | fever |
| Taraxacum officinale      | Asteraceae  | common dandelion aerial parts | intestinal problems, reduce blood pressure, straining |
| Thymus sp.                | Lamiaceae   | thyme leaves       | coughs, colds                                  |
| Thymus sp.                | Lamiaceae   | french thyme aerial parts | endoparasites                                  |
| Tilia europea             | Tilaceae    | linden flowers     | hormone imbalances                             |
| Ulmus rubra, U fulva      | Ulmaceae    | slippery elm bark  | soothe gut, abscesses, over-acidity, diarrhoea, wounds, gastroenteritis |
| Urtica dioica             | Urticaceae  | nettles aerial parts | summer itch                                    |
| Valeriana officinalis     | Valerianaceae| valerian root   | nervousness                                    |
| Verbascum thapsus         | Scrophulariaceae | mullein aerial parts | counteract Lasix, respiratory problems         |
| Viburnum opulus           | Caprifoliaceae | crampbark bark | acute colic, cramps, respiratory problems, stomach ache |
| Vitex agnus-castus         | Verbenaceae | agnus castus, chaste tree | hormone imbalances |
| Zanthoxylum americanum    | Rutaceae    | prickly ash bark   | flush lactic acid from muscles, muscle soreness |
| Zingiber officinalis      | Zingiberaceae | ginger rhizome | intestinal problems                            |
was reported to flush lactic acid and toxins from muscles. Milk thistle (Silybum marianum) seed and burdock root (Arctium lappa) were also used. Animals either self-medicated with white willow (Salix alba) or they were given white willow (Salix sp.) bark or meadowsweet (Filipendula ulmaria), aerial parts or root, for inflammation and pain. A combination of devil’s claw (Harpagophytum procumbens) decoction and a demulcent such as marshmallow (Althea officinalis) (aerial parts), was put on the food.

**Plants used for exercise induced pulmonary haemorrhage (EIPH)**

One breeder used a commercial herbal product containing lungwort (Pulmonaria officinalis) compounds, bioflavonoids and vitamin K for EIPH. That breeder also used alfalfa hay [or soaked alfalfa pellets] in a 1 : 4 ratio with the regular hay. Furosemide, a diuretic often used in the treatment of EIPH, was thought to dehydrate the horse. To reduce this effect, a tea was given with 1 part each of the following: licorice (Glycyrrhiza glabra) root, aerial parts of mullein (Verbascum thapsus) or mallow (Althea sp.), and comfrey (Symphytum officinalis) root.

**Plants used for endoparasites**

Horses were dewormed four times a year with a weekly preparation of the following powdered herbs added to the feed daily for one week: Elecampane (Inula helenium), or wormwood (Artemisia sp.), cut finely or ground. Alternatively wormwood was given in equal combination with elecampane (Inula helenium) and thyme (Thymus sp.).

Occasional-use dewormers were french thyme (Thymus sp.), given 2 tbsp a day for week (1/2 the dose for a pony). Or one bucket of grated red carrot (Daucus carota) added to feed on a daily basis to reduce pinworms. To expel tapeworms 2–3 cups of chopped pumpkin flesh and seed (Cucurbita pepo) was added to the feed.

**Plants used for eye problems, eye infections**

An infusion with saline solution was made with equal parts of the following: eyebright (Euphrasia officinalis) fresh or dry leaves, calendula (Calendula officinalis) flowers, and comfrey (Symphytum officinalis) leaves. The infusion was strained carefully and used as an eyewash. The infusion was weakened as the condition improved. Eyebright (Euphrasia officinalis) (1 tbsp/day) was added to the food, with water, for under a week. Two tea bags of chamomile (Matricaria chamomilla) or 2 heaping tsps of fresh or dried chamomile herbs was steeped with 1 cup of hot water and strained before the liquid was used as an eyewash.

**Plants used as a heart tonic**

2 tbsp a day of hyssop (Hyssopus officinalis) paste was given infeed or 20 – 30 ml tincture was given in the drinking water to increase blood pressure. Berries, leaves or flowers of hawthorn (Crataegus oxyacantha) were said to be cardi tonic. Meadowsweet (Filipendula ulmaria) reportedly thinned the blood and removed pain. A paste was made of 2 tbsp dandelions (Taraxacum officinale) or milk thistle (Silybum marianum) and given in the feed to decrease blood pressure.

**Plants used for hormone imbalances**

For hormone imbalances a tea was made with one of the herbs given below or 1 tsp of the ground herb was put directly on the food. Leaves of strawberry (Fragaria virginiana), flowers of linden (Tilia europea) (safe for pregnant animals), flowers of evening primrose (Oenothera biennis) or flowers of chamomile (Matricaria recutita syn. Matricaria chamomilla) were used. Berries of agnus castus or chaste tree (Vitex agnus-castus) were utilised for severe cases. Chaste tree was said to stop production of testosterone (used as an herbal gelding). Leaves of lady’s mantle (Alchemilla vulgaris) and aerial parts of passion flower (Passiflora incarnata) were also used. A tea of crampbark (Viburnum opulus) was given if the animal had cramps (cramps that the respondent thought were hormonally-linked).

**Plants used during pregnancy**

Dried leaves of red raspberry (Rubus idaeus) (1/4 cup) were mixed with one cup of water and put on top of the grain. This mixture was syringed into the horses’ mouths if they did not eat it. It was used for the last month and a half of pregnancy.

**Plants used for respiratory problems (snots)**

Elecampane (Inula helenium) was mixed with crampbark, powdered or chopped root of liquorice and thyme (Thymus sp.) and was used for stable cough. Alternatively blended cloves of garlic (Allium sativum) were added to the feed. Crampbark powder (Viburnum opulus) was added to the feed of wind-broken horses.

One cup each of the following plants were blended and used as a hot mash in feed or as a tea for snots: elecampane (Inula helenium), licorice (Glycyrrhiza glabra), thyme (Thymus sp.) (1/4 cup) and mullein. Cloves of garlic and fenugreek seeds (Trigonella foenum-graecum) were also added. In addition, pure garlic powder and mullein (Verbascum thapsus) were fed with grain (once or twice a day) until the horse’s nose stopped running. Equal parts of white willow (Salix alba) bark and/or leaf, and dried aerial parts of each of the following were mixed together into a paste and given to feverish horses: feverfew (Tanacetum parthenium), meadowsweet (Filipendula ulmaria) and yarrow (Achillea millefolium).
Plants used for sore muscles, sprains, joint pain or reaction of horses to selenium shot in the chest

One heaping tsp of cayenne pepper (Capsicum sp.) was mixed with enough olive oil to make a paste which was then rubbed on the affected part. A purchased 1:5 cayenne tincture was substituted for the paste (if available).

Plants used for skin problems

An infusion of 1.5 tsp aerial parts of shepherd’s purse (Capsella bursa-pastoris) steeped in 1.5 cups of water, was strained and used as a wash. Chickweed (Stellaria media) rinse or salve was applied to the affected area twice daily. Powdered sulphur was added to calendula (Calendula officinalis) infused oil and used for front fetlock irritation. External applications used for hypersensitivity reactions due to fly bites and other causes of skin irritation consisted of dried, crushed plantain (Plantago major) leaves and witchhazel (Hamamelis virginiana) added to rubbing alcohol and applied topically. A sting from a nettle plant (Urtica dioica) was soothed with fresh crushed shepherd’s purse (Capsella bursa-pastoris) and/or yellow dock (Rumex crispus) leaves appliedtopically. An internal treatment consisted of a tea of dried baical skullcap (Scutellaria baicalensis) given in the feed.

One application of old car oil, or fish or cod liver oil was used topically to treat ringworm. The crushed root of calendula (Calendula officinalis) was then applied as a poultice to stimulate hair follicle growth three days later. Alternatively fluoride toothpaste was put on the affected areas and brushed off the following morning; this treatment was repeated until the problem resolved. Plants used for summer itch and sunburn included dried nettles (Urtica dioica) added to rubbing alcohol and applied topically. An internal treatment consisted of a tea of dried baical skullcap (Scutellaria baicalensis) given in the feed.

Plants used to treat various intestinal conditions

For digestive problems one bottle of Guinness® (beer) was administered orally or mixed in with the feed. Ginger (Zingiber officinalis) (powdered, liquid or crystallized) or chopped leaves of peppermint (Mentha piperita) was also administered orally or mixed in with food or water. Horses were allowed to self-medicate with organic dandelions (Taraxacum officinale).

Plants used for colic

Chamomile (Matricaria recutita) and peppermint (Mentha piperita) were used for stomach acid. White willow bark (Salix sp.) was used to repair the stomach lining. Slippery elm bark powder (Ulmus fulva) was used for over-acidity, diarrhea and gastroenteritis. Bedstraw (Galium sp.) was used for grass colic – 1 handful of crumpled aerial parts in the feed. Skullcap (Scutellaria lateriflora) was given for pain. Licorice root (Glycyrrhiza glabra) was used for its synergistic action. For acute colic a crampbark (Viburnum opulus) paste was administered orally as a first aid measure before calling the veterinarian. Or a 1:1 mixture of skullcap and slippery elm bark powder and (1:4) licorice was given. Aerial parts of skullcap (Scutellaria lateriflora) were put in the feed for two to three days after the colic occurred to revive gut flora. One tbsp (15 ml) nutritional yeast was added to the feed everyday for prevention of colic.

Plants used to treat stress

The following herbs were used preventively before stressful situations: aerial parts of dry or fresh betony (Stachys officinalis); powdered hops strobiles (Humulus lupulus), was added to the feed daily or made into a tea; or powdered aerial parts of marshmallow (Althea officinalis). Powdered licorice root (Glycyrrhiza glabra), was given daily in advance of stressful situations. Slippery elm (Ulmus fulva) bark powder was given to soothe the gut. Chamomile (Matricaria recutita) flowers were recommended for high-strung horses. Fresh or dry leaves of wild blackberry (trailing wild blackberry, Rubus ursinus), were fed ad lib. The following were used as teas or as powders in the feed with chicory (Cichorium intybus), slippery elm bark powder and crampbark as the main ingredients. They were used separately or in combination. If used separately, 1 tbsp of each ingredient was used with yoghurt as a paste base. In combination, 1 tbsp of each herb was steeped in boiling water and 1 cup of the tea given to the horse in the drinking water or put in the feed: crampbark (Viburnum opulus) for stomach ache; slippery elm bark powder (Ulmus fulva) for over-acidity, diarrhoea and gastroenteritis; hops buds (Humulus lupulus) act as a sedative; chamomile (Matricaria recutita) and peppermint to soothe stomach acid; less peppermint (Mentha piperita) is used in a blend than if given alone; chicory (Cichorium intybus); white willow bark (Salix sp.) rebuilds stomach lining; skullcap (Scutellaria lateriflora) for pain and a nerve tonic; licorice root (Glycyrrhiza glabra) synergistic action.

Plants used as a tonic after races

Red sage (Salvia officinalis) tea (1 tbsp of leaves per cup of boiling water) was cooled and put into their mash. Bran mash with 1 cup brewed coffee was used after the race and at least two days before the next one. Astragalus membranaceus was used to help recovery from a long illness; 1 tsp to 1 tbsp was added to the feed. Lavender (Lavandula augustifolia) was hung upside down in the stable where the horse could not reach it; the smell was soothing.
Plants used for urinary problems including edema ("stocked-up")

Ten buchu leaves (Barosma betulina or Barosma crenulata), or uva-ursi leaves (Arctostaphylos uva-ursi), were fed to horses after races as a kidney tonic. For minor bladder infections powdered uva-ursi aerial parts and chopped or powdered leaves of dandelions (Taraxacum officinale), were mixed and fed every day until the horse's legs were no longer swollen, or the horse was no longer straining to urinate (usually one to three days). Either fresh or dried parsley (Petroselinum crispum) was added to the feed once a day or more often until the urine cleared up. Dandelion aerial parts were fed ad lib.

Review of the ethnomedicinal literature

The review below (Table 3) describes a selection of the clinical trials and experimental studies using ethnopharmacologically accepted models that have verified the traditional and therefore ethnoveterinary use of the plants described in the results section. In the few cases in which clinical trials have not yet been carried out, the range of therapeutically important and relevant biological properties of the plant is provided. Recent research has indicated that Betonica and Stachys may be separate genera or subgenera and this should be taken into consideration when reviewing the pharmacological literature on betony [19].

Discussion and conclusion

There have been very few studies conducted on the use of herbs for horses. In one study on exercise induced pulmonary haemorrhage (EIPH) researchers evaluated two Chinese herbal formulas used in the USA to reduce EIPH (Yunnan Paiyao and Single Immortal). They used a randomized cross-over design with an exercise test in five Thoroughbred horses [140]. They found a statistically significant increase in time-to-fatigue after the treatment with Single Immortal, but no other result. The herbs used to treat EIPH in British Columbia are not found in the typical Chinese lung healing formula. Trinidad has a small Chinese population (> 1%) and no Chinese herbs (herbs used in a manner consistent with the principles of Chinese traditional medicine) were recorded [4].

The Santa Rosa track has a turf course that is not used as frequently as the sand course. In the wet season the sand course is described as "sloppy". These track conditions may have led the respondents in Trinidad to describe tendon problems as the second biggest problem after lung problems. There are some links between historically Amerindian treatments and EVM used for horses in Trinidad. For example clay was used by Native American groups to treat broken bones in horses and humans [141]. Like the Trinidad respondents, Native Americans used blistering agents as horse stimulants [142]. Lastly Amerindians (Pawnee Omaha and Ponca) fed the pounded bulbs of Oxalis stricta and Oxalis violacea to horses to make them fleet [143].

Participants in Trinidad were more reluctant to give specific dosages than their counterparts in BC. Several of the participants in Trinidad claimed that they previously used ethnoveterinary remedies but declined to specify what they had used in the past. The use of cow itch on race day is considered an offence by the Trinidad and Tobago Racing Authority; however there was no indication that the un-revealed plants mentioned above were also in this illicit category. Participants in BC also had an "illicit" plant: coffee was being used as a tonic after races – however a withdrawal period was observed.

Many of the plants being used for horses in BC were purchased as already formulated products. This fact reflects the different statuses of medicinal plant use in the two research areas. In Canada, there are several associations of alternative health practitioners and many certifying bodies. Canada also has a new Natural Health Products policy that regulates what is sold over the counter. It is difficult to compare the expenditure on horses in Trinidad and BC since statistics for Trinidad horses do not exist. However it is likely that more money is spent on medicinal products for horses in BC. A 1998 Canadian National Horse Industry Study showed that the total annual expenditure on grooming and health products was $90,000 or $105/horse/year [144].

Herbal medicine also has greater status in Canada because the plants of European-origin have been evaluated by the German Commission E or by Chinese scientists. Trinidad, in contrast, has one regional association of herbal practitioners – the Caribbean Association of Researchers and Herbal Practitioners (CARAPA), which was formed in 1998. This grouping consists largely of scientists, other professionals and only a few of the most prominent herbalists. Very few clinical trials have been conducted on plants that are native to the Caribbean. Most labelled and standardized products are foreign in origin. Rather than being available for purchase the Trinidad remedies listed in this paper were self-prepared by the users.

The largest category of plants used for horses in BC was for wounds and abscesses. The next largest category was for anxiety and nervousness. The third largest group was used for hormone imbalances. This last category of treatment was not described in Trinidad.

More research has been carried out on the temperate and Chinese plants used in BC and there is a greater commercial production of the plants being used for horses there. Therefore the BC ethnoveterinary remedies have stronger evidence of efficacy than those in Trinidad. This may also
| Species                  | Phytochemical and pharmacological information                                                                                                                                                                                                 | References |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| Arctostaphylos uva-ursi | Leaves contain arbutin which is converted in alkaline urine to hydroquinone (antibacterial and anti-inflammatory action).                                                                                                                                                                               | 20–25      |
| Astragalus membranaceus | *Astragalus* increases T-cell-mediated immune functions *in vitro*, in mice, and in uncontrolled trials in humans. Polysaccharide fractions enhance phagocytosis, increase macrophage numbers, and enhance humoral immunity. *Astragalus* root increases the immune-stimulating effects of interleukin-2 and acyclovir.                             | 26–31      |
| Calendula officinalis   | *Calendula* is anti-inflammatory and promotes epithelialization; it is also used for focal skin irritation.                                                                                                                                                                                                 | 32–34, 28  |
| Cecropia pachystachya    | *Cecropia pachystachya* showed weak bronchodilator activity and cardiovascular toxicity on endovenous administration on dogs and rabbits. *Cecropia obtusifolia* has shown antihypertensive, diuretic, hypoglycemic, analgesic and central depressor effects. An infusion prepared with the leaves of *C. obtusifolia* produced beneficial effects on carbohydrate and lipid metabolisms when it was administered to patients with type 2 diabetes. | 35–36      |
| Cichorium intybus        | Four of six rat stomachs were protected from EtOH damage by aqueous extracts of *Cichorium intybus*.                                                                                                                                                                                                         | 37         |
| Cordia curassavica       | *Cordia curassavica* hexane extracts showed antibacterial activity against Gram-positive and Gram-negative bacteria. The crude dichloromethane extract of *Cordia curassavica* showed significant antiedematogenic activity and antinociceptive activity.                              | 38–39      |
| Crataegus oxycantha      | Hawthorn (*Crataegus oxycantha*) may increase myocardial contractility and reduce peripheral vascular resistance. The *Crataegus* cohort in one study showed less marked symptoms of heart failure after 2 years (fatigue, stress dyspnoea, palpitations).                                 | 40–42      |
| Curcuma longa            | In a randomised, double-blind, placebo-controlled, parallel group clinical trial of P54FP, 61 client-owned dogs with osteoarthritis were randomly allocated to receive P54FP (an extract of *Curcuma domestica* and *Curcuma xanthorrhiza*) or a placebo orally twice daily for eight weeks. There was a statistically significant treatment effect in favour of P54FP (P = 0.012). The clinical efficacy of a formulation containing roots of *Withania somnifera*, the stem of *Boswellia serrata*, rhizomes of *Curcuma longa* and a zinc-complex (Articulin-F), was evaluated in a randomized, double-blind, placebo controlled, cross-over study in 42 patients with osteoarthritis for three months. Treatment with the herbomineral formulation produced a significant drop in severity of pain (P < 0.001) and disability score (P < 0.05). | 43–44      |
| Desmodium adscendens     | The butanolic extract of *Desmodium adscendens* inhibits contraction of the ileum and trachea in guinea pigs. Three active triterpenoid glycosides were found. An extract of *Desmodium grahami* produced a concentration-dependent inhibition of spontaneous ileum contractions. The extract showed antimicrobial activity against pathogenic enterobacteria supporting its ethnomedical use for gastrointestinal disorders. Three antimicrobial isoflavones were isolated from *Desmodium canum*. | 45–48      |
| Echinacea purpurea       | *Echinacea purpurea* has been investigated for its potential to activate the innate immune response. A time course study, using the time of sheep red blood cells (SRBC) immunization to mimic the onset of illness, examined the effects of 8 and 4 days of *Echinacea purpurea* treatment at 0.6 mL/kg/day. Only in the 4-day administration, with dosing beginning 1 hour after SRBC immunization, was there an observed enhancement of the antibody forming cell response. This supports the acute use of *Echinacea purpurea* in traditional medicine, and demonstrates the potential for enhancement of humoral and innate immune responses. | 49         |
| Equisetum arvense        | *Equisetum arvense* has demonstrated hypoglycaemic and diuretic activity. The hydroalcoholic extract of stems of *Equisetum arvense* produced an anticoagulant effect and anti-inflammatory activity linked to beta-sitosterol, campesterol and isofucosterol. A standardized extract from horsetail (*Equisetum arvense*) was administered to 11 volunteers following a flavonoid-free diet for 8 days. Hippuric acid, the glycine conjugate of benzoic acid, increased twofold after drug intake. | 50–51      |
| Filipendula ulmaria      | Meadowweet (*Filipendula ulmaria*) contains a heparin-like anticoagulant in the flowers. An ointment composed of flowers of *Filipendula ulmaria* was studied for its efficacy against uterine cervical cancer in 48 patients. Positive responses were recorded in 32 patients (67%), including 25 cases (52%) of complete regression of dysplasia. | 52–56      |
| Galium aparine           | Asperuloside, an iridoid, is a mild laxative and has anti-inflammatory activity.                                                                                                                                                                                                                         | 56         |
| Glycyrrhiza glabra       | This plant has been studied for its synergistic properties and its usefulness for respiratory conditions.                                                                                                                                                                                                 | 57–60      |
| Harpagophytum procumbens | Chrubasik has conducted large trials with human patients using devil’s claw and found that it relieved pain. *Harpagophytum procumbens* preparation was used to treat ten horses for degeneration of the proximal intertarsal, distal intertarsal and tarsometatarsal joints and found to be equivalent to the phenylbutazone control. Devil’s claw has a protective action against arrhythmia. | 61–66      |
Table 3: Non-experimental validation of ethnoveterinary remedies used for horses in BC and Trinidad (Continued)

| Plant | Description |
|-------|-------------|
| **Hyssopus officinalis** | Antimicrobial activity of hyssop is linked to polysaccharides, essential oil, cafffeic acid, tannins, and specifically (--)cis- and (--)trans-3-pinanones. Polysaccharides and crude extracts were active against HIV-type 1 and HIV-3 and non-toxic to uninfected cells. Extracts suppress hyperglycemia. | 68–69 |
| **Lavandula angustifolia** | Extracts, fractions and essential oil of Lavandula angustifolia are reported to have CNS-depressant, anti-convulsive, sedative, anti-bacterial effects. Lavender (Lavandula sp.) has been used as a nocturnal sedative for elderly patients in the form of an air freshener. It has shown benefits in cancer care and stress. The calcium channel blocking activity of the aqueous-methanolic extract of Lavandula stoechas flowers (LS) may be responsible for the folk uses. At a dose of 600 mg/kg of LS, mice were calm and relaxed. | 70–72 |
| **Lavandula augustifolia** | Forty-two patients with advanced cancer were randomly allocated to receive weekly massages with lavender essential oil and an inert carrier oil (aromatherapy group), an inert carrier oil only (massage group) or no intervention (four week courses). Sleep scores improved significantly in both the massage and the combined massage (aromatherapy and massage) groups. There were also statistically significant reductions in depression scores in the massage group. | 73 |
| **Magnolia grandiflora** | A Chinese prescription containing Magnolia bark and ginger rhizome among others, is used to treat mental illnesses. Administration of this decoction and fluoxetine produced beneficial effects on rats subjected to chronic mild stress. Magnolia grandiflora contains magnolol and honokiol which exhibit a central nervous system effect and muscle relaxant activity (Bastidas et al., 1998). An improved elevated plus-maze test in mice revealed the anxiolytic potential of honokiol from Magnolia officinalis and Magnolia abovata. | 74–76 |
| **Matricaria recutita syn. Matricaria camomilla** | Apigenin is the sedative ingredient in chamomile. Aqueous 70% methanol extracts of Chamomilla recutita inhibited the growth of Helicobacter pylori, a Gram-negative bacteria responsible for chronic gastritis, peptic ulceration and gastric cancer. Treatment with Angelica sinensis and Matricaria chamomilla reduced hot flushes in menopausal women. | 77–81 |
| **Mentha piperita** | Peppermint (Mentha piperita) may reduce intestinal spasm and in one study, enhanced gastric emptying. Several studies of the efficacy of peppermint oil on irritable bowel syndrome showed that its activity was linked to the relaxation of intestinal smooth muscle. One study reported that peppermint odour had a positive effect on running speed. | 82–85 |
| **Momordica charantia** | Momordica charantia has many medicinal properties. | 86 |
| **Mucuna pruriens** | The spicular hairs of the pod of Mucuna pruriens penetrate skin causing intense irritation. Hairs contain 5-hydroxytryptamine (serotonin) and the itching produced by the hairs is due to the liberation of histamine in the epidermal layer of the skin. | 87–89 |
| **Musa paradisiaca** | Musa sapientum var. Cavendishii contains soluble and insoluble dietary fibre that contributes to its hypo-cholesterolaemic effect. Other studies found that dried unripe plantain banana (Musa sapientum L. var.paradisiaca) was anti-ulcerogenic. One study found that extracts of both raw Musa sapientum Linn. Musa paradisiaca bananas protected the rat stomach from indomethacin-induced injuries. The extract from Musa sapientum Linn. had a significant healing effect on acetic acid-induced ulcers. | 90–93 |
| **Nasturtium officinale** | Histamine release inhibitors (flavonols and megastigmans) were found in watercress (Nasturtium officinale). Phenethyl isothiocyanate (PEITC) which is released upon chewing of watercress (Nasturtium officinale) is a chemoprotective agent. | 94–97 |
| **Nopalea cochenillifera** | More studies need to be conducted on this plant. An oral glucose tolerance test showed that stems of Nopalea cochenillifera raises blood glucose levels in mice. | 98 |
| **Oxalis corniculata** | Five Oxalis species including Oxalis corniculata have been used to treat skin infections and unspecified microbial infections. Dichloromethane extracts of Oxalis erythrhorhiza showed activity against methicillin-resistant and methicillin-sensitive strains of Staphylococcus aureus as well as towards five dermatophytes. Embelin also inhibits the five dermatophytes. | 99 |
| **Passiflora incarnata** | In one non-randomized clinical observatory trial a combination product composed of valerian root and passion flower extracts was evaluated using 20 ambulatory patients (Dhawan et al., 2004). The plant combination reduced occipital regional central hyperactivity after 2 weeks. The anxiety and depression self rating decreased for all patients. Many other studies, and adverse reactions, are summarised in this paper. | 100 |
| **Petroselinum crispum** | Parsley’s diuretic effect was validated in rat experiments. Six rats offered an aqueous parsley seed extract to drink, eliminated a significantly larger volume of urine per 24 h (P < 0.001) as compared to when they were drinking water, but less than that observed with known diuretics amiloride and furosemide. The rats served as their own controls. | 101 |
| **Pimenta racemosa** | Antinociceptive and anti-inflammatory effect activity was found in the leaves of Pimenta racemosa. | 102 |
| **Plantago major** | Plantago major contains several compounds that aid in wound healing. The polysaccharide fraction from P. major protects against pneumococcal infection in mice when administered systemically, with prechallenge by stimulation of the innate immune system. | 103–105 |
Table 3: Non-experimental validation of ethnoveterinary remedies used for horses in BC and Trinidad (Continued)

| Plant Name | Description |
|------------|-------------|
| Pulmonaria officinalis | The anti-coagulant glycopeptide from *Pulmonaria officinalis* reduces the death rate of animals with exogenous thromboplastemia. T-100 anticoagulants were isolated from the ammonia extract of *Pulmonaria mollissima*. The anticoagulants consist of a peptide and a glycopeptide which in nontoxic doses causes stable hypocoagulemia in animals. |
| Prunella vulgaris | The polysaccharide prunelline has immunomodulation effects and some constituents have antioxidative, anti-inflammatory, and moderate activity on Gram positive bacteria. Other polysaccharides have antiviral activity. The aqueous fraction of the plant inhibits anaphylactic shock, allergic reactions, protects rat erythrocytes against haemolysis and kidney and brain homogenates against lipid peroxidation. |
| Psidium guajava | Leaf extracts of *Psidium guajava* act as antiarrhhoic agents by a triple pronounced antibacterial, antiamoebic and antispasmodic action (inhibition of intestinal motility). |
| Ricinus communis | The wounded leaf of *Ricinus communis* contained increased free fatty acids and diacylglycerol and decreased in phospholipids. Leaves of *Ricinus communis* are nematicidal. |
| Salix spp. | A standardized willow bark extract was examined in 127 outpatients with osteoarthritis and rheumatoid arthritis in 2 randomized, controlled, double-blind trials with follow up for 6 weeks. No statistical differences were found. Ethanolic Salix extract 1520L inhibits COX-2-mediated PGE2 release through compounds that were not salicin or salicylate. In a 4-week blinded trial, 210 patients with an exacerbation of chronic low back pain were randomly assigned to receive an oral willow bark extract with either 120 mg (low dose) or 240 mg (high dose) of salicin, or placebo, with tramadol as the sole rescue medication. The numbers of pain-free patients in the last week of treatment were 27 (39%) of 65 in the group receiving high-dose extract, 15 (21%) of 67 in the group receiving low-dose extract, and 4 (6%) of 59 in the placebo group (P <0.001). Significantly more patients in the placebo group required tramadol (P <0.001) for each week of the study. |
| Salvia officinalis | *Salvia officinalis* is reported to have anti-bacterial, fungistatic, virustatic, astringent, eupeptic, hypotensive, anti-spasmodic, central nervous system-depressant actions, anti-inflammatory and anti-hydrotic effects. Its water and alcohol extracts have anti-viral activity. The chloroform extracts of *Salvia officinalis* leaves, and the active compound ursolic acid, showed anti-inflammatory properties after topical application. |
| Scrophularia nodosa | Phenolic fractions of aerial parts of *Scrophularia frutescens* and sambucifolia showed potent antibacterial activity. Saikosaponins from *Scrophularia scorodonia* had in vivo anti-inflammatory effects. |
| Silybum marianum | Several studies have been found that milk thistle (*Silybum marianum*) has liver protectant properties. |
| Stachys officinalis | The hydroalcoholic extract of *Stachys lavandulifolia* showed anxiolytic effects with lower sedative activity than diazezapam. Aqueous 70% methanol extracts of *Stachys alopecuros* inhibited the growth of *Helicobacter pylori*. |
| Stachytarpheta jamaicensis | After intraperitoneal administration of gradual aqueous doses obtained from *Stachytarpheta jamaicensis* leaves in rats the following effects were seen: a reduction of motor activity and the alarm reaction, ataxia, sedation, analgesia, anesthesia, ptosis, piloerection, head tremors and a significant reduction of body temperature followed by apnea and the death of the animals. Iridoid ipolamiide and the phenylpropanoid glycoside, verbascoside, were found. The crude protein level of *Stachytarpheta jamaicensis* is fairly high. |
| Tanacetum parthenium | Feverfew (*Tanacetum parthenium*) has antinociceptive and anti-inflammatory effects attributed to the parthenolide content in the leaves and flowers. |
| Taraxacum officinale | Teas composed of common dandelion root and aerial parts are licensed in Germany for the treatment of biliary disorders, digestive and gastrointestinal complaints, and to provoke diuresis. |
| Ulmus fulva | Slippery elm (*Ulmus fulva*) is effective on its own as a demulcent in dogs with mild stomach ulcers. |
| Verbascum thapsus | Mullein (*Verbascum thapsus*) leaves and flowers have expectorant and demulcent properties (from mucilaginous constituents) which are used to treat respiratory problems such as bronchitis, dry coughs, whooping cough, tuberculosis, asthma, and hoarseness. Mullein is mildly diuretic and has a soothing and anti-inflammatory effect on the urinary tract, and acts as a mild sedative. Leaf extracts of *Verbascum thapsus* have shown antiviral, antibacterial and antifungal activity. |
| Viburnum opulus | Water-soluble polysaccharide fractions were isolated from the squeezed berries of *Viburnum opulus*. Some plant polysaccharides have immunostimulating activity: they enhance phagocytosis. |
| Vitex agnus-castus | Animal experiments have shown evidence of a dopaminergic effect of *Vitex agnus-castus*. |
explain why there are more equine ethnoveterinary remedies that are used with greater confidence in BC than in Trinidad and Tobago. The tropical plants _Aloe vera_ and _Curcuma longa_, two extensively researched plants, were being used in both areas. The ethnoveterinary use of _Ricinus communis_ is similar to the ethnomedicinal use described in early British herbas [4]. These herbas later became global standard texts especially in those areas (like Trinidad and Canada) with a British colonial heritage. Some of the ethnoveterinary remedies used in Trinidad such as firing and blistering are no longer recommended in orthodox veterinary medicine, but these and some of the other ethnoveterinary remedies still used in Trinidad can be found in older Veterinary textbooks [145,146] and their use in Trinidad may originate from those sources.

Acknowledgements

The research in British Columbia was funded by the Social Sciences and Humanities Research Council of Canada (SSHRC) Grant # 820-2002-1008. Thanks to Dr. Evelyn Mathias for professional support, to the Herbarium at the University of Victoria and to all of the participants in both Canada and Trinidad and Tobago.

References

1. Bennett BC, Prance GT: Introduced plants in the indigenous pharmacopoeia of Northern South America. Economic Botany 2000, 54(1):90-102.
2. Voeks RA: Tropical Forest healers and habitat preference. Economic Botany 1996, 50:382-400.
3. Harris R: Local Herbs Used in the Chinese Way (Tonics). Book I. The Traditional Chinese Medical Centre, Trinidad and Tobago, WJ 1991.
4. Lans C: Creole remedies of Trinidad and Tobago. Lulu.com 2006 [http://www.lulu.com/content/302210].
5. Cozier JD, Robertson L: Introduced plants in the indigenous pharmacopoeia of Northern South America. Economic Botany 2000, 54(1):90-102.
6. Voeks RA: Tropical Forest healers and habitat preference. Economic Botany 1996, 50:382-400.
7. Harris R: Local Herbs Used in the Chinese Way (Tonics). Book I. The Traditional Chinese Medical Centre, Trinidad and Tobago, WJ 1991.
8. Lans C: Creole remedies of Trinidad and Tobago. Lulu.com 2006 [http://www.lulu.com/content/302210].
9. Cozier JD, Robertson L: Memories of the turf: The history of horse racing in Trinidad and Tobago. Caribbean Information Systems and Services Ltd. Trinidad and Tobago 1994.
10. Trinidad and Tobago House of Representatives, Friday November 19, 1999 [http://www.ttparliament.org/hansard/house/1999/991119/hansard19991119e00294.htm].
11. BC-MAFF, n.d. About the Agriculture Industry: Horses [http://www.agf.gov.bc.ca/aboutind/products/livestck/horses.htm].
12. Nalven J: Measuring the unmeasurable: a micrometrical study of an undocumented population. In Anthropological praxis: Translating knowledge into action Edited by: Wulf RM, Fiske SJ. Westview Press, USA; 1987:34.
13. Brownor CH, Ortiz de Montellano BR, Rubel AJ: A methodology for cultural-ethnomedical research. Current Anthropology 1988, 29:681-702.
14. Heinrich M, Rimpler H, Antonio Barrera N: Indigenous phytotherapy of gastrointestinal disorders in a lowland Mixe community (Oaxaca, Mexico): Ethnopharmacological evaluation. Journal of Ethnopharmacology 1992, 36:63-80.
15. Lans C, Harper T, Georges K, Bridgewater E: Medicinal plants used for dogs in Trinidad and Tobago. Prev Vet Med 2000, 45:201-220.
16. Turner NJ, Hebda RJ: Contemporary use of bark for medicine by two Salishan native elders of southeast Vancouver Island, Canada. Journal of Ethnopharmacology 1990, 29(1):59-72.
17. Turner N, Nancy J, Bell MAM: The ethnobotany of the Coast Salish Indians of Vancouver Island. Economic Botany 1971, 25(1):63-104. 25(3):333-339
18. Turner NJ: Ethnobotany of the Bella Coola Indians of British Columbia. Sysics 1973, 6:193-220.
19. Ritch-Krc EM, Turner NJ, Towers GH: Carrier Herbal Medicine: an Evaluation of Antimicrobial and Anticaner Activity in Some Frequently Used Remedies. Journal of Ethnopharmacology 1996, 52:151-156.
20. Turner NJ, Thompson C, Thompson MT, York AZ: Thompson Ethnobotany Victoria: Royal British Columbia Museum; 1990.
21. Turner N, Thomas J, Carlson BF, Oglivie RT: Ethnobotany of the Nite- naht Indians of Vancouver Island Victoria: British Columbia Provincial Museum and Parks Canada, Western Region; 1983.
22. Turner N, Bouchard R, Kennedy DIOB: Ethnobotany of the Okanagan-Camille Indians of British Columbia and Washington Victoria British Columbia Provincial Museum; 1980.
23. Marín PD, Grayer RJ, Grueč-Jovanovic S, Kite GC, Veitch NC: Glycosides of tricetin methyl ethers as chemosystematic mark- ers in Stachys subgenus Betonica. Phytochemistry 2004, 65(9):1247-53.
24. Beauch D, Fleurentini J, Mortier F: Effect of extracts of Orhtophos rho- stis stamineus Benth, Hieracium pilosella L.,Sambucus nigra L. and Rici- stospsilos ova-ursi (L.) Spreng. in rats. Phytother Res 1999, 13:222-3.
25. Ritch-Krc EM, Thomas S, Turner NJ, Towers GHN: Carrier Herbal Medicine: Traditional and Contemporary Plant Use. Journal of Ethnopharmacology 1996, 52:85-94.
26. Schindler G, Patacz U, Brinkhaus B, von Niecieka A, Witaj J, Krahmer N, Gläckl I, Veit M: Urinary metabolism of metabolites of arbutus- tin after oral administration of Arbutus unedo sanguinaria extract as film-coated tablets and aqueous solution in healthy humans. Journal of Clinical Pharmacology 2002, 42(8):920-7.
27. Yarnell E: Botanical medicines for the urinary tract. World Jour- nal of Urology 2002, 20:285-293.
28. DeSmet PAGM, D’Arcy PF: Drug interactions with herbal and other non-orthodox remedies. In Mechanisms of Drug Interactions Edited by: D’Arcy PF, McIntay JC, Welling PG. New York, NY: Springer-Verlag; 1996:327-352.
29. Wynn SG, Marsden SA: Manual of Natural Veterinary Medicine: Science and Tradition. Mosby; St Louis, 2003.
30. Guo FC, Kwakkel RP, Williams BA, Parmentier HK, Li WK, Yang ZQ, Verstegen MW: Effects of mushroom and herb polysaccha- ride on cellular and humoral immune responses of Eimeria tenella -infected chickens. Poultry Science 2004, 83(1):124-132.
31. Liu J, Yang M, Du X: Herbal medicines for viral myocarditis. Cochrane Database Systematic Review 2004, 3:CD003711.
32. Shao BM, Xu W, Dai H, Hu P, Li Z, Gao XM: A study on them- immune receptors for polysaccharides from the roots of Astraga- lus membranaceus, a Chinese medicinal herb. Biophysical Research Communications 2004 Aug 6, 320(4):1101-11.
33. Klouche-Popova E, Popov A, Pavlova N, Krusteva S: Influence of the physiological regeneration and epithelialization using fractions isolated from Calendula officinalis. Acta Physiol Pharmacol Bulg 1982, 8(4):63-67.
34. Cordova CA, Siqueira IR, Netto CA, Yunes RA, Volpato AM, Cechi- nel Filho V, Curi-Pedrosa R, Crezczynski-Pasa TB: Protective prop- erties of butanolic extract of the Calendula officinalis L. (marigold) against lipoperoxidation of rat liver microsomes and action as free radical scavenger. Redox Rep 2002, 7(2):95-102.
35. Consolini AE, Miglior GN: Cardiovascular effects of the South American medicinal plant Cecropia pachycentra (Rambay) on rats. Journal of Ethnopharmacology 2005, 96(3):417-22.
36. Herrera-Arellano A, Aguilar-Santamaria L, Garcia-Hernandez B, Nicola- sio-Torres P, Tortoreillo J: Clinical trial of Cecropia obtusifolia and Marrubium vulgare leaf extracts on blood glucose and serum lipids in type 2 diabetics. Phytotherapy 2004, 11:561-566.
48. Monache GD, Botta B, Vinciguerra V, de Mello JF, de Andrade Chiap-54. Kudriashov BA, Liapina LA, Azieva LD:
51. Graefe EU, Veit M:
52. Stoss M, Michels C, Peter E, Beutke R, Gorter RW:
37. Gürbüz I, Üstün O, Yes ¸ilada E, Sezik E, Akyürek N: Journal of Ethnobiology and Ethnomedicine
39. Bayeux MC, Fernandes AT, Foglio MA, Carvalho JE:
40. Wynn Susan G:
41. Habs M:
49(5): 239-46. Article in Russian
55. Peresun'ko AP, Bespalov VG, Limarenko AI, Aleksandrov VA:
56. Schoen Allen M, Wynn Susan , (Editors): Enhanced immune response by
57. Wynn Susan , (Editors): Emerging Therapies: Using Herbs and Nutraceuticals for Small Animals. American Animal Hospital Association 1999.
58. Williamson EM:
59. Voprosy Onkologii
60. Tanaka Y, Kikuzaki H, Fukuda S, Nakatani N: Antibacterial com-
61. Black A: The quality of clinical trials with Harpagophyllum procumbens. Phytomedicine 2003, 10(6–7):613-23.
62. Montavon S. Efficacy of a medicinal plant preparation based on Harpagophyllum procumbens in cases of bone spavin of adult horses. Praktische Veterinäre Europäische 1994, 26(1):49-53.
63. Chrubasik S, Conradt C, Black A: The quality of clinical trials with Harpagophyllum procumbens. Phytomedicine 2003, 10(6–7):613-23.
64. Chrubasik S, Conradt C, Roufogalis BD: Effectiveness of Harpagophyllum procumbens. Phytatherapy Research 2003, 17(10):165-72.
65. Chrubasik S, Konch H, Breitschwerdt H, Zappe H: Effectiveness of harpagophyllum extract WS 1531 in the treatment of exacerbation of low back pain: a randomized, placebo-controlled, double-blind study. Phytatherapy Research 2003, 17(10):165-72.
66. Chrubasik S, Conradt C, Black A: The quality of clinical trials with Harpagophyllum procumbens. Phytomedicine 2003, 10(6–7):613-23.
67. Chrubasik S, Black A, Pollak S: Effectiveness of devil’s claw for osteoarthrosis. Rheumatology 2002, 41:1332-3.
68. Montavon S. Efficacy of a medicinal plant preparation based on Harpagophyllum procumbens in cases of bone spavin of adult horses. Praktische Veterinäre Europäische 1994, 26(1):49-53.
69. Gollapudi S, Sharma HA, Aggarwal S, Byers LD, Enslie HE, Gupta S: Isolation of a previously unidentified polysaccharide(MAR-10) from hyssopus officinalis that exhibits strong activity against human immunodeficiency virus type-1. Biochemical and Biophysical Research Communications 1995, 210:40-51.
70. Miyazaki H, Matsuura H, Yanagya C, Mizutani J, Tsuji M, Ishihara C: Inhibitory effects of hyssopus officinalis extracts on intestinal alpha-glucosidase activity and postprandial hyperglycemia. Journal of Nutritional Science and Vitaminology 2003, 49(5):346-9.
71. Hajhashemi V, Ghanadai A, Sharif B: Anti-inflammatory and anal-
72. Gilani AH, Aziz N, Khan MA, Shaheen F, Jabeen Q, Siddiqui BS, Herzig JW: Ethnopharmacological evaluation of the anticonvulsant, sedative and antispasmodic activities of Lavandula stoechas L.: Journal of Ethnopharmacology 2006, 101(2):161-7.
73. Blumenthal M, Goldberg A, Brinckmann J, (Editors): Herbal Medi-
74. Page 18 of 20
Scrophularia sambucifolia. Journal of Ethnopharmacology 1996, 53(1):11-14.

120. Bermejo Benito P, Abad Martinez MJ, Silvan Sen AM, Sanz Gomez A, Fernandez Matellano L, Sanchez Contreras S, Diaz Lanza AM: In vivo and in vitro antiinflammatory activity of saikosaponins. Life Science 1998, 63(13):147-56.

121. Boerth J, Strong KM: The clinical utility of milk thistle (Silybum marianum) in cirrhosis of the liver. Journal of Herbal Pharmacotherapy 2002, 2(2):1-7.

122. Lieber CS, Leo MA, Cao Q, Ren C, DeCarli LM, Rabbani M, Sajjadi SE, Zarei HR, Stamatis G, Kyriazopoulos P, Gole gou S, Basayiannis A, Skaltsas S, Alvarez E, Leiro JM, Rodriguez M, Orallo F, Boodoo A, Ramjee R, Hulman B, Dolberg F, Rowe J: Silymarin retards the progression of alcohol-induced hepatic fibrosis in baboons. Journal of Clinical Gastroenterology 2003, 37(4):336-9.

123. Marin PD, Grayes Rj, Gruje-Jovanovic S, Kite GC, Veitch NC: Glycosides of tricetin methyl ethers as chemosystematic markers in Stachys subgenus Betonica. Phytochemistry 2004, 65(9):1247-53.

124. Mhyase T, Yamamoto R, Ueno A: Phenylethanoid glycosides from Mentha officinalis. Phytochemistry 1996, 43(2):475-9.

125. Rabbani M, Sajjadi SE, Zarei HR: Anxiolytic effects of Stachys lavandulifolia Vahl on the elevated plus-maze model of anxiety in mice. Journal of Ethnopharmacology 2003, 89(2-3):271-6.

126. Stamatis G, Kyriazopoulos P, Golegou S, Baskasas S, Skaltsas S: In vitro anti-Helicobacter pylori activity of Greek herbal medicines. Journal of Ethnopharmacology 2003, 88(2-3):175-9.

127. Melita Rodriguez S, Castro O: Pharmacological and chemical evaluation of Stachytarpheta jamaicensis (Verbenaceae) on the respiratory burst of rat macrophages. Phytotherapy Research 2004, 18(6):457-62.

128. Alvarez E, Leiro JM, Rodriguez M, Orallo F: Inhibitory effects of leaf extracts of Stachytarpheta jamaicensis (Verbenaceae) on the respiratory burst of rat macrophages. Phytotherapy Research 2004, 18(6):457-62.

129. Boerth J, Strong KM: The clinical utility of milk thistle (Silybum marianum) in cirrhosis of the liver. Journal of Herbal Pharmacotherapy 2002, 2(2):1-7.

130. Jain NK, Kulkarni SK: Chaste tree (Vitex agnus-castus) – pharmacology and clinical indications. Phytomedicine 2003, 10(2):185-96.

131. Mehrotra R, Ahmed B, Vishwakarma RA, Thakur RS: Verbacoside, a new luteolin glycoside from Verbascum thapsus. Journal of Natural Products 1989, 52:640-643.

132. McCutcheon AR, Roberts TE, Gibbons E, Ellis SM, Babiuk LA, Hanafy SM: Anxiolytic effects of leaf extracts of Stachys subgenus Betonica. Journal of Ethnopharmacology 2003, 88(2-3):175-9.

133. Melita Rodriguez S, Castro O: Pharmacological and chemical evaluation of Stachytarpheta jamaicensis (Verbenaceae) on the respiratory burst of rat macrophages. Phytotherapy Research 2004, 18(6):457-62.

134. Turker Arzu Ucar, Camper ND: Biological activity of common mullein, a medicinal plant. Journal of Ethnopharmacology 2002, 82(2-3):117-25.

135. Ovodova RG, Golovchenko VV, Popov SV, Shashkov AS, Ovodov IuS: The isolation, preliminary study of structure and physiological activity of water-soluble polysaccharides from squeezed berries of snowball tree Viburnum opulus. Bioorganicheskaya Khimiya 2000, 26(1):61-67. Article in Russian.

136. Liu J, Burdette JE, Sun Y, Deng S, Schlecht SM, Zheng W, Nikolic D, Mahady G, van Breenen RB, Fong HH, Pezzuto JM, Botlon JL, Farnsworth NR: Isolation of linoleic acid as an estrogenic compound from the fruits of Vitex agnus-castus L. (chaste-berry). Phytochemistry 2004, 61(18-19):77-81.

137. Wuttke W, Jarry H, Christoffel V, Spengler B, Seidlova-Wuttke D: Chaste tree (Vitex agnus-castus) – pharmacology and clinical indications. Phytomedicine 2003, 10(4):348-57.

138. Blumenthal M: Interactions between herbs and conventional drugs: Introductory considerations. In Herbs — everyday reference for health professionals Ottawa: Canadian Pharmacists Association and Canadian Medical Association; 2000:9-20.

139. Epp TS, McDonough P, Padilla DJ, Cox JH, Poole DC, Erickson HH: The effect of herbal supplementation on the severity of exercise-induced pulmonary haemorrhage. Equine and Comparative Exercise Physiology 2004, 2(1):17-25.

140. Lawrence EA: Human and horse medicine among some Native American groups. Agriculture and Human Values 1998, 15(3):133-138.

141. Kern JR, Cardellina JH: II: Native American medicinalplants. Anemomin from the horse stimulant Clematis hirsutissima. Journal of Ethnopharmacology 1983, 8(1):121-123.

142. Moerman DE: Native American Ethnobotany Portland Timber Press; 1998.

143. Horse Industry Survey. BC Annual expenditure for products and services [http://www.equinecanada.ca/EquineCanada/Horses/Statistics/index.html]

144. Milks HJ, Zeissig A: Practical veterinary pharmacology, material medic and therapeutics. Alex Eger Inc. Chicago; 1949.

145. Adams OR: Lameness in horses 2nd edition. Lea and Febiger, Philadelphia; 1967.