




Spontaneous poisoning by *Baccharis vulneraria* Backer in cattle¹

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ABSTRACT.- Costa L.S., Cristo T.G., Withoeft J.A., Bilicki J.V., Pisetta N.L., Bortoluzzi R.L.C., Klug C.M. & Casagrande R.A. 2022. **Spontaneous poisoning by *Baccharis vulneraria* Backer in cattle.** *Pesquisa Veterinária Brasileira* 42:e06961, 2022. Laboratório de Patologia Animal, Centro de Ciências Agroveterinárias, Universidade do Estado de Santa Catarina, Av. Luís de Camões 2090, Conta Dinheiro, Lages, SC 88520-000, Brazil. E-mail: renata.casagrande@udesc.br

Baccharis vulneraria Backer is a sub-shrub frequently found in southern Brazil, which leads to gastrointestinal tract intoxication. The objective of this study is to describe epidemiological, clinical and anatomopathological aspects of two cases of *B. vulneraria* poisoning in cattle. Two bovines from two different municipalities in the Itajaí Valley, Santa Catarina, Brazil were necropsied and performed the histopathological evaluation and botanical classification of the plant found in the pasture. Bovine 1 had dehydration, ruminal atony, diarrhea, congested mucous membranes and hypothermia for 20 hours, and died during clinical care. At necropsy, there was moderate multifocal detachment and reddening of the forestomachs mucosa. Bovine 2 presented anorexia, dry feces, ruminal atony, vocalization and muscle tremors for ten days, unresponsive to treatments, evolving to death. At necropsy were seen loosening of the mucosa with marked diffuse reddening and transmural edema. The microscopic exam revealed degeneration, necrosis, vesiculation, and detachment of the forestomachs' mucosa, associated with moderate multifocal neutrophilic infiltrate (Bovine 1); marked diffuse transmural necrosis, edema, hemorrhage, and marked fibrinous exudation (Bovine 2). A large amount of *B. vulneraria* was found in the pastures, with signs of consumption. In this report, a case of subacute evolution of *B. vulneraria* poisoning was observed, since the poisoning by this plant is usually acute. More knowledge about poisoning by this plant is necessary for the prevention and control, avoiding new mortality cases.

INDEX TERMS: Spontaneous poisoning, *Baccharis vulneraria*, cattle, toxic plants, gastrointestinal tract, ruminant, *Baccharidastrum triplinervium*.

RESUMO.- [Intoxicação espontânea por *Baccharis vulneraria* Backer em bovinos.] *Baccharis vulneraria* Backer é um subarbusto frequentemente encontrado no sul do Brasil, que leva a um quadro de intoxicação nocivo ao trato gastrointestinal. O objetivo deste trabalho é descrever aspectos epidemiológicos, clínicos e anatomopatológicos de dois casos de intoxicação por

B. vulneraria em bovinos. Foram necropsiados dois bovinos de dois municípios do Vale do Itajaí, Santa Catarina, Brasil, com avaliação histopatológica dos órgãos e classificação botânica dos exemplares da planta localizada nos piquetes. No exame clínico do Bovino 1 foram constatados desidratação, atonia ruminal, diarréia, mucosas congestionadas e hipotermia durante 20 horas,

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com morte durante atendimento clínico. Na necropsia, havia desprendimento e avermelhamento multifocais moderados na mucosa dos proventrículos. Já o Bovino 2 teve manifestações clínicas de anorexia, fezes secas, atonia ruminal, vocalização e tremores musculares por 10 dias, não responsivas a tratamento, evoluindo para óbito. Na necropsia, havia desprendimento da mucosa dos proventrículos, com avermelhamento e edema transmural difusos acentuados. No exame histológico havia degeneração e necrose da mucosa proventricular, vacuolização e desprendimento do epitélio, infiltrado neutrofílico multifocal moderado (Bovino 1), e necrose transmural difusa acentuada, edema, hemorragia e exsudação fibrinosa acentuados (Bovino 2). Grande quantidade de *B. vulneraria* foi encontrada nas pastagens dos bovinos, com sinais de consumo. É relatado um caso de evolução subaguda de intoxicação por *B. vulneraria*, visto que a intoxicação por essa planta geralmente tem curso agudo. Conhecimentos acerca desta planta são necessários para prevenção e controle da intoxicação, evitando novos casos de mortalidade.

TERMOS DE INDEXAÇÃO: Intoxicação espontânea, *Baccharis vulneraria*, bovinos, plantas tóxicas, trato gastrointestinal, ruminante, *Baccharidastrium triplinervium*.

INTRODUCTION

Baccharis vulneraria Backer is a sub-shrub, belonging to the Asteraceae family, commonly known by its most relevant synonyms: *Baccharidastrium triplinervium* (Less.) Cabrera, *Conyza triplinervia* Less. and *Archibaccharis vulneraria* (Baker) Heering ex Malag. (Flora do Brasil 2020). Popularly known as "holy grass" in Brazilian flora (Barroso & Bueno 2002) it is recognized for its petiolate, lanceolate, elliptical to ovate leaves, with serrated margins and obtuse base, furrowed stems and heterogamous arrangement (Heiden et al. 2012). The species *B. vulneraria* has a wide distribution in South America and is frequently found in southern Brazil, a country that has more than one hundred *Baccharis* species described, with *B. coridifolia* and *B. megapotamica* being the species commonly reported as toxic agents (Heiden 2009, Tokarnia et al. 2012). It occurs in Paraguay, Brazil, Uruguay, and Argentina. In Brazil, it is found in the Southeast (Minas Gerais - MG, Espírito Santo - ES, Rio de Janeiro - RJ and São Paulo - SP) and South (Paraná - PR, Santa Catarina - SC and Rio Grande do Sul - RS) regions, in the Atlantic forest and pampa biomes (Heiden et al. 2012).

The plant occupies natural fields, capons, and secondary forests, especially in shallow soils (Barroso & Bueno 2002). In Santa Catarina, the species occurs at the plateau's edge, extending into municipalities in the highlands, where it occurs in transition vegetation between the Mixed and Dense Ombrophylous Forest (Barroso & Bueno 2002). It is considered a medicinal plant because it has potential bactericidal and fungicidal activity from its essential oils (Stüker 2007). In the veterinary literature, there is only one article discussing poisoning by *B. triplinervium*, describing the experimental reproduction of the disease and cases of spontaneous poisoning (Langohr et al. 2005).

Animals affected by poisoning by *B. vulneraria* may show clinical signs similar to poisoning by other plants or toxic substances that affect the digestive system. This condition is considered as a differential diagnosis of acute sodium fluorosilicate poisoning (Panziera et al. 2018) and for other plants of the genus *Baccharis*, such as *B. coridifolia*, causing death, mainly

in cattle (Rissi et al. 2005) and in sheep (Hammerschmitt et al. 2018); and *B. megapotamica* (Driemeier et al. 2000, Pedroso et al. 2010, Panziera et al. 2015). This report aims to describe epidemiological, clinical, and anatomopathological aspects of two cases of *B. vulneraria* poisoning in cattle from Vale do Itajaí/SC, Brazil.

MATERIALS AND METHODS

Epidemiological and clinical data were obtained at visits to the properties and from veterinary care during the outbreaks. Two bovines from two different municipalities of the Vale do Itajaí region, Santa Catarina, were necropsied. Samples from all organs were collected in 10% buffered formalin, routinely processed for histopathological analysis, stained with hematoxylin and eosin (HE), and evaluated by optical microscopy. Specimens of the plant in various stages of development were also collected during the epidemiological evaluation of the properties and sent to the Lages Herbarium of the "Universidade do Estado de Santa Catarina" (LUSC-CAV-UDESC) for identification and botanical classification.

RESULTS

The first poisoning outbreak occurred in January 2018, in a flock of 50 beef cattle, 15-20 months-old, on a property that acquires calves and raises them for meat production. The flock was kept in an area of 100ha of native pasture, divided into paddocks. The affected flock was kept in the same paddock without toxic plants for months. It was then transferred to another paddock, with an area of 20ha of native pasture with several specimens of *Baccharis vulneraria*. The bovines did not know the plant, it was the first contact of the bovines with this species. One bovine (female, 18-month-old, crossbred) had clinical signs of apathy and diarrhea 48 hours after the paddock transfer (Bovine 1). The owner removed this animal from the pasture and requested veterinary medical attention. Clinical examination revealed severe dehydration, ruminal atony, diarrhea, congested mucous membranes, cold extremities, and hypothermia. The heifer died 20 hours after the onset of clinical signs and underwent necropsy. Another animal was found dead (possibly by the same cause) a few hours after the picket transfer, but necropsy was not performed. The flock was removed from this pasture and no more cases occurred.

The second case occurred in October 2018, on a property of eight hectares with a Jersey herd of 14 lactating cows. The plant occupied about 0.5 hectares in total, distributed in multiple foci. The feed was based on native pasture, maize silage, and corn bran. The property did not rotate pasture, and there was low availability of pasture for animals that demanded high consumption. One 7-year-old Jersey cow (Bovine 2) presented anorexia, dry feces, ruminal atony, vocalization, and muscle tremors for ten days, in addition to head pressing. In the first visit, treatment was based on the administration of antitoxic (Bioxan valé[®], 500ml, IV, SID, for three days), liver protector (Antitóxico SM[®], 100ml, IV, SID, for five days), Dipyrone (D500[®], 50mg/kg, IV, SID, for five days), Sulfamethoxazole + Trimethoprim (Borgal[®], 10mg/kg, IM, SID, for five days) and sodium bicarbonate (100g, orally, SID, for four days). After six days, the animal showed no clinical improvement, continued to show the same clinical signs. Still, with the progression of signs of abdominal pain and discomfort. Ringer Lactate (20ml/kg/h, IV, one hour/

day, single dose), Flunixin meglumine (Banamine[®], 1.1mg/kg, IV, SID, single dose) and liver protector (Hepatoxan valle[®], 100ml, IV, single dose) were administered. The animal died a few hours after applying these medications. It was instructed to cut and eliminate the plants, in addition to transferring the animals from the areas affected by the toxic plant, and no more animals subsequently affected were reported. Both cases located in the Itajaí Valley region, Santa Catarina, the first in the municipality of Pouso Redondo (Lat.: 27°15'27" S, Long.: 49°55'58" W), and the second in the municipality of Braço do Trombudo (Lat.: 27°21'31" S, Long.: 49°53'2" W).

The mucosa of the forestomachs (Bovine 1) showed moderate multifocal detachment and redness (Fig.1), which extended from the submucosa to the deeper muscle layers of the wall. The abomasum presented a reddening of the mucosa and moderate diffuse edema accompanied by hemorrhage from the submucosa and muscle layers. Bovine 2 showed loosening of the mucosa of the forestomachs, marked diffuse redness and transmural edema (Fig.2), in the omentum there was a moderate amount of clots and fibrin covering the serosa of all organs of the gastric complex. The thoracic portion of the esophagus and the abomasum presented ulcers up to 1cm in diameter, in the mucosa, surrounded by hemorrhagic halos, fibrin residues and plant fibers. Due to the low granulometry of the material in the rumen, it was not possible to observe whole parts of the plant.

The histopathological evaluation of the forestomachs showed degeneration and necrosis of the mucosa, with vesiculation and detachment of the epithelium, in addition to moderate multifocal neutrophilic infiltrate (Bovine 1) and accentuated diffuse transmural necrosis (Fig.3), accompanied by edema, hemorrhage, marked neutrophilic infiltration, and fibrinous exudation, as well as intralesional bacterial myriads and vessel thrombosis (Bovine 2). The forestomachs and abomasum serosa presented neutrophilic infiltrate associated with fibrin deposition and markedly diffuse cellular debris (Bovine 2). In the abomasum, from the mucosa extending to the submucosa and muscular layers, there was necrosis associated with neutrophilic and lymphoplasmacytic infiltrate, in addition to fibrinous exudation and moderate multifocal cellular debris (Bovine 2). The thoracic esophagus showed moderate multifocal necrosis of the mucosa (Bovine 2) (Fig.4).

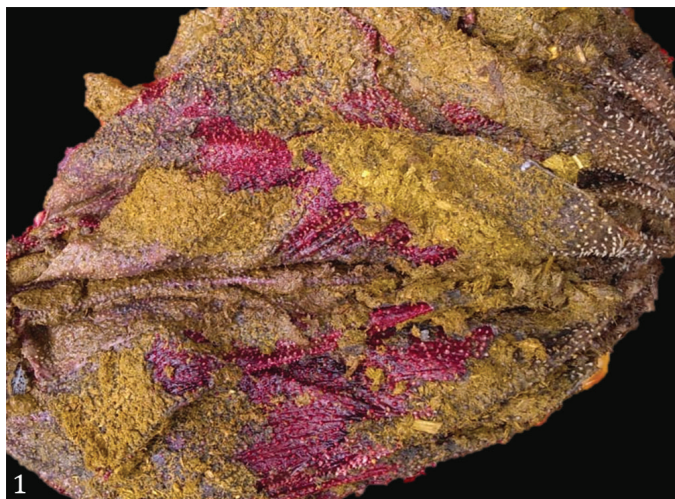


Fig.1. Spontaneous poisoning by *Baccharis vulneraria* in cattle. Extensive detachment and reddening of omasal mucosa.

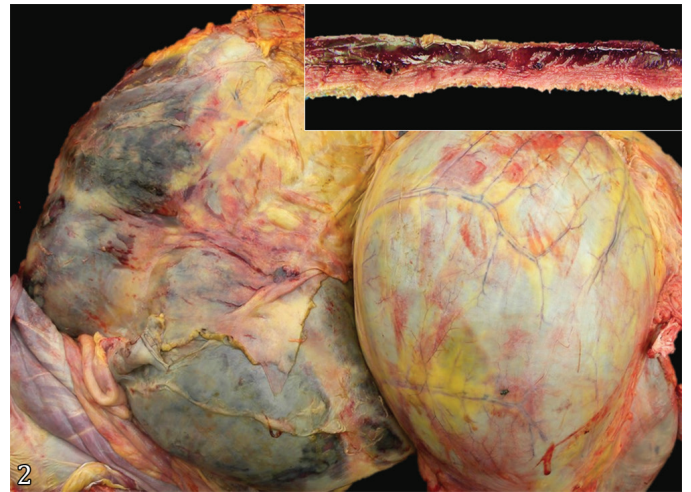


Fig.2. Spontaneous poisoning by *Baccharis vulneraria* in cattle. Extensive hemorrhages are seen at ruminal serosa. Inset: see hemorrhage and marked diffuse transmural edema at the cross-section of the ruminal wall.

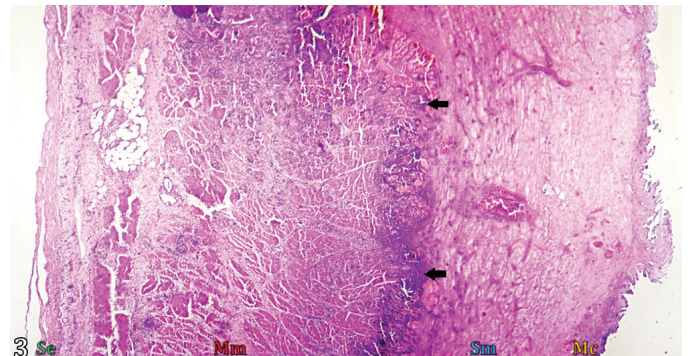


Fig.3. Spontaneous poisoning by *Baccharis vulneraria* in cattle. Rumen: marked diffuse transmural necrosis, accompanied by moderate multifocal neutrophilic infiltration, and intralesional bacterial myriads (arrow) (Bovine 2). Serosa (Se), muscular (Mm), submucosa (Sm), mucosa (Mc). HE, obj.10x.

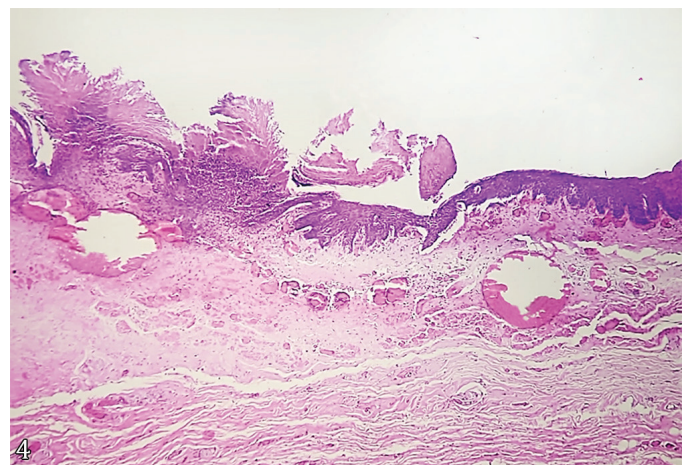


Fig.4. Spontaneous poisoning by *Baccharis vulneraria* in cattle. thoracic esophagus showed moderate multifocal necrosis of the mucosa (Bovine 2). HE, obj.50x.

A large number of *B. vulneraria* specimens at different stages of development, mainly in the adult phase, were found in cattle pastures (Fig.5 and 6) of the two properties, sometimes also found with segmented foliage, apparently consumed by cattle. The plants developed in areas of native pasture scarcity, sometimes in humid places. No other toxic plants were observed in the fields during the inspection of the properties.

DISCUSSION

The epidemiological analysis in the present report was decisive for confirming the diagnosis. The main epidemiological factors observed corroborate with other research directed at disorders related to plants, such as the visualization of this species in pastures, signs of consumption of the plants, and the history of recent transfer to an infested pasture, as in the case of Bovine 1 (Langohr et al. 2005, Tokarnia et al. 2012). Several factors may be related to the higher consumption of the plant, such as access to a previously inaccessible area with high plant density and scarcity of green forage due to the drought during specific seasons (Langohr et al. 2005). In the first case, despite the pasture availability, the ingestion occurred because the bovines did not know the plant until this first contact, whereas in the second case, it was evidenced that there was consumption of the plant due to the limited availability of pasture.

The diagnosis of poisoning by *Baccharis vulneraria* in this study was based on the epidemiological characteristics and the clinical and anatomopathological findings. The macroscopic and histological lesions observed were similar to those described in another outbreak of poisoning by the same plant (Langohr et al. 2005). Poisoned animals can present an acute clinical evolution, with death in 12 to 67 hours (Langohr et al. 2005), similar to that observed in Bovine 1. However, Bovine 2 showed subacute clinical signs, with a clinical progression of 10 days until death. The clinical and anatomopathological findings were similar to those described in poisoning by *Baccharis*

coridifolia (Rissi et al. 2005, Tokarnia et al. 2012), *Baccharis megapotamica* var. *weirii* (Baker) (Driemeier et al. 2000), and *Eupatorium tremulum* (Lucioli et al. 2007a), requiring epidemiological evaluation and visualization of the plant in the properties presenting poisoning cases.

The macroscopic lesions were restricted to the digestive system and similar to those observed in another report of poisoning by *Baccharidastrum triplinervium*, characterized by reddening and edema of the mucous membranes (Langohr et al. 2005). However, in addition to these changes, the lesions of the present report showed excessive severity, which includes loosening of mucous membranes and ulcerations covered by fibrinous exudate, also associated with bleeding from gastric compartments. These injuries may be directly related to the cause of death of the animals, which may have been enhanced by the severity of the clinical changes, with intense electrolyte imbalance, dehydration, apathy and hemorrhage (Rissi et al. 2005, Panziera et al. 2015). These changes with a higher degree of severity can be considered similar to those described in cases of poisoning by other species of *Baccharis* (Rissi et al. 2005, Pedroso et al. 2010), acute sodium fluorosilicate poisoning (Panziera et al. 2018), *Eupatorium tremulum* (Lucioli et al. 2007a) and organic arsenic (Gonçalves et al. 2017). Therefore, the identification of *B. vulneraria* at the properties, the absence of other plants with the same clinical course and the history of ingestion by local cattle were essential to exclude these differentials. So far, there are no reported cases of poisoning by *B. vulneraria* describing an esophageal lesion. For the authors, the main reason for its occurrence was the excessive consumption of the plant associated with ruminal atony, which may have favored the stagnation of the ingested or regurgitated material for large periods in the esophagus, increasing the contact of the toxic component in the mucosa and providing the injury.

Histologically, the lesions were present in all the forestomachs, esophagus, and abomasum. However, previous reports describe



Fig.5. Spontaneous poisoning by *Baccharis vulneraria* in cattle. Subshrub individually occurring in a natural environment in an open field area, registered in the city of Pouso Redondo.

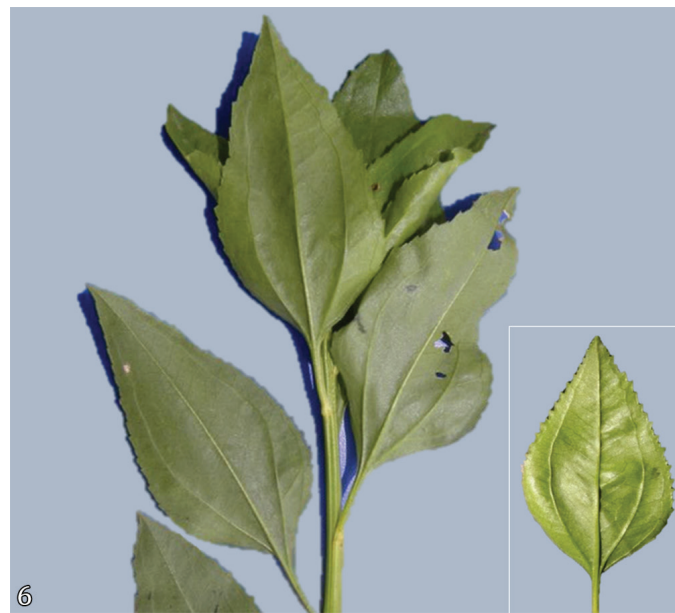


Fig.6. Spontaneous poisoning by *Baccharis vulneraria* in cattle. Branch showing the insertion of alternate, petiolate leaves, with trineural veins and serrated margins (in detail).

lesions only in the rumen (Langohr et al. 2005). A study indicates that *B. vulneraria* can be consumed in low amounts, causing mild gastrointestinal disturbances, which may not result in the animal's death, justifying the lighter intensities of the anatomopathological alterations described (Langohr et al. 2005). In the current report, the paddock of property 2 presented a large amount of *B. vulneraria* with low pasture availability which may be related to the severity of the lesion.

The toxic potential of plants of the genus *Baccharis* is defined by the high amounts of macrocyclic trichothecenes, which are mycotoxins converted from fungi absorbed from the soil (Jarvis 1992). However, such mycotoxins have been isolated and identified in *B. coridifolia* and *B. megapotamica* (Jarvis 1992, Tokarnia et al. 2012), having no evidence of the isolation of these compounds in *B. vulneraria*. Previous studies have evaluated these substances in *B. triplinervium*, obtaining negative results (Langohr et al. 2005). Therefore, this species' active ingredient capable of developing poisoning remains unknown (Tokarnia et al. 2012). It is suggested that the lesions result from the plant's irritant action on the gastrointestinal mucosa (Langohr et al. 2005).

Toxic substances unrelated to plants can also induce macroscopic lesions restricted to the gastrointestinal tract, which may be similar to those found in this work, highlighting the importance of inclusion in the possible differential causes for *B. vulneraria* poisoning, such as acute or chronic poisoning by sodium fluorosilicate (Lucioli et al. 2007b, Panziera et al. 2018). The lesional pattern is characterized macroscopically by diffuse redness of the forestomach's mucosa, accompanied by edema and ulceration (Lucioli et al. 2007b). Histologically, there is necrosis and ulceration of the forestomachs and abomasum epithelium (Panziera et al. 2018). Poisoning induced by this substance has already been reported in cases of cattle mortality in southern Brazil. The diagnosis depends on an epidemiological analysis, investigating the ingestion of pastures or water sources contaminated by industrial chemical residues. Typically, these outbreaks occur in locations close to industries and chemical treatment centers (Lucioli et al. 2007b, Panziera et al. 2018). Another condition that induces a clinical presentation similar to the current case is ruminal acidosis. However, the epidemiological characteristics are mainly related to excessive carbohydrate intake (Afonso & Mendonça 2007).

CONCLUSIONS

This study brings a case of poisoning by *Baccharis vulneraria* with subacute clinical evolution; poisoning by plants of the *Baccharis* genus is usually acute, and the animals die quickly.

The dissemination of knowledge regarding this plant is necessary for the agricultural community. Thus, the toxic principle must be investigated.

Additionally, it is essential to understand control measures to introduce animals from areas free from pastures with this plant species or increase the care with the lack of pasture availability, helping prevent and control this disorder, avoiding new mortality cases.

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