

***Uncaria tomentosa* (Willd.) D.C.**



Unha de gato Família = *Rubiaceae*.

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- **Histórico** = Amplamente distribuída na floresta amazônica do Peru é muito utilizada pelos índios nativos. Seu nome é atribuído à semelhança de seus espinhos com as unhas dos felinos.



***Uncaria tomentosa* (Willd.) D.C.**

- **Histórico** = A grande difusão mundial, partiu da Europa, onde os primeiros estudos científicos foram realizados, na década de 70. Nas colônias austríacas e alemãs da Amazônia Peruana, Oscar Schuller tratou seu pai de 78 anos com câncer em estágio avançado, tendo sido usado por 6 meses o chá da unha de gato, com cura da doença.

Uncaria tomentosa



- **Aspectos botânicos = Grande arbusto trepador, chegado a 20 metros de altura; ramos jovens de forma quadrangular; talos com espinhos de até 2 cm de comprimento; folhas com curto pecíolo de até 1,5 cm de largura e 10-15 cm de comprimento; flores de até 9 cm de comprimento , branco-amareladas; fruto bivalvo de até 9 mm de comprimento.**

Uncaria tomentosa

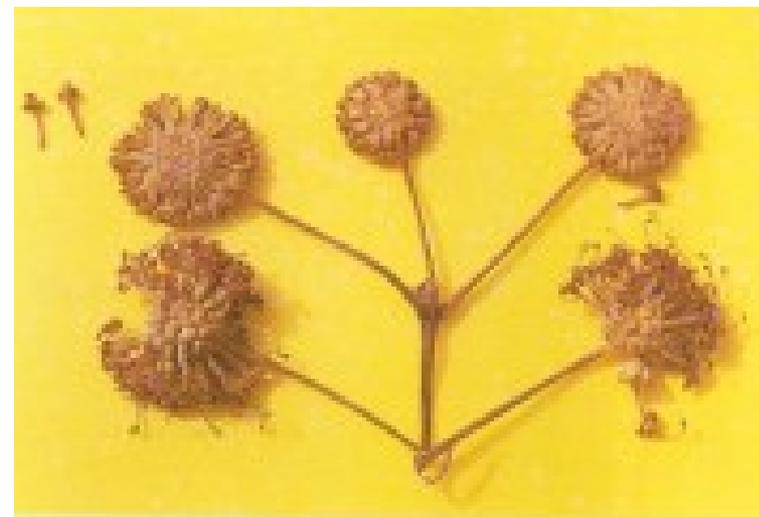
- Quando comparada com a *Uncaria guianensis*, esta possui espinhos menos curvos, folhas menores, hastes mais anguladas.



U. tomentosa



U. guianensis



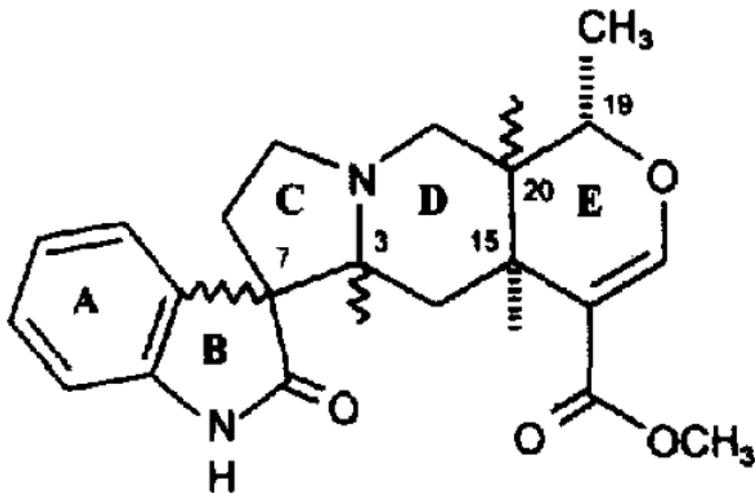
Uncaria tomentosa

- **Informações agronômicas =**
A coleta de **sementes** é **dificultada pela altura da planta**, sendo a **micropropagação** a **técnica mais indicada para a produção da espécie.**

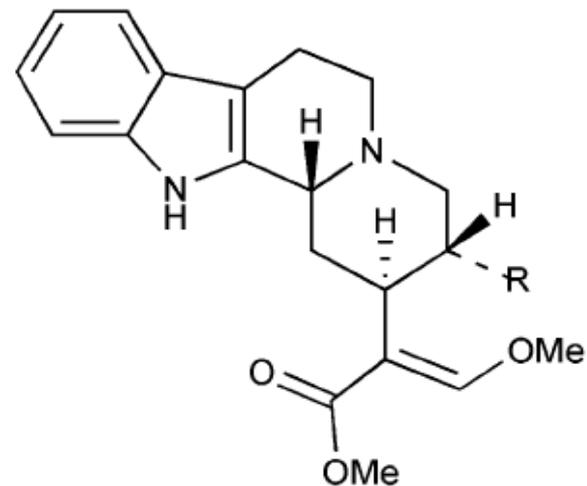


Uncaria tomentosa

- **Presença de quimiotípos**= Plantas de *U. tomentosa* apresentam dois quimiotipos: alcalóide oxindólico pentacíclicos e alcalóide indólico.



Uncarina



Hirsutina R=Et

Distribuição geográfica das espécies de *Uncaria*

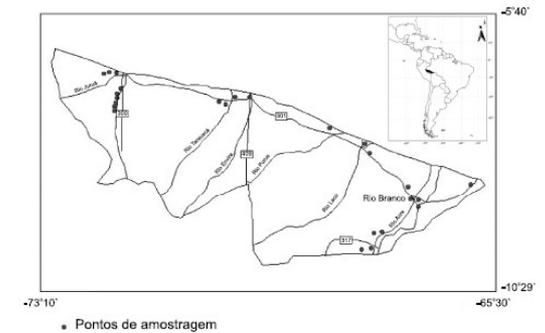
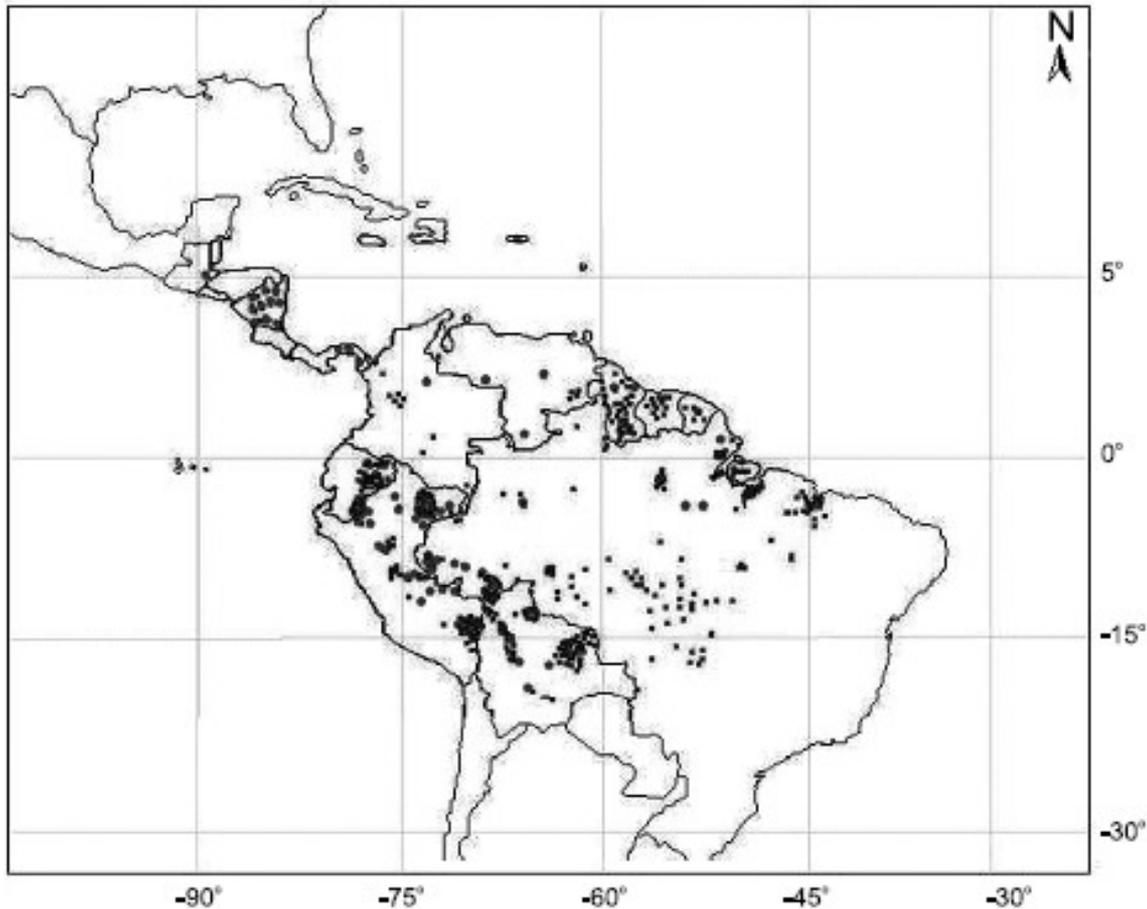
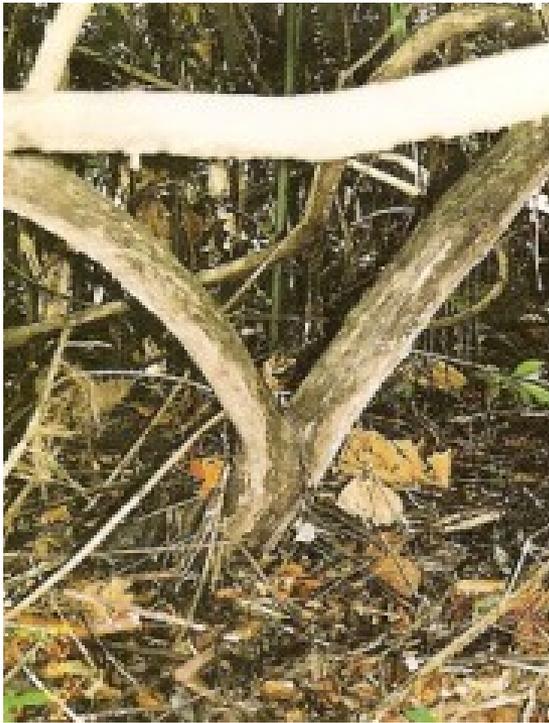


Figura 2 - Localização dos pontos de amostragem no Estado do Acre

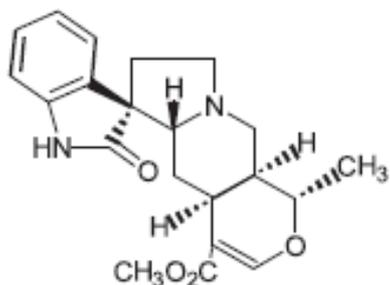
Uncaria tomentosa

- Parte utilizada = Casca do tronco

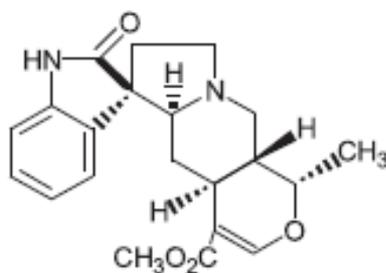


Uncaria tomentosa

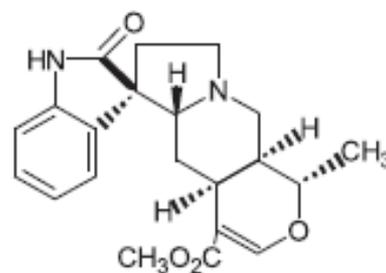
- Grande quantidade de alcalóides oxindólico pentacíclicos e indólico, triterpenos e polifenóis são os responsáveis pela vasta atividade biológica apresentada pela planta.



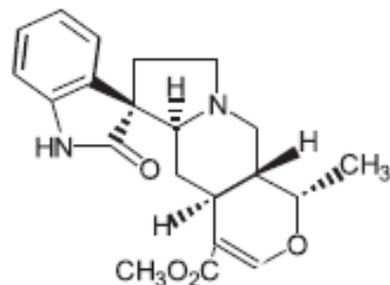
1- Espociofilina



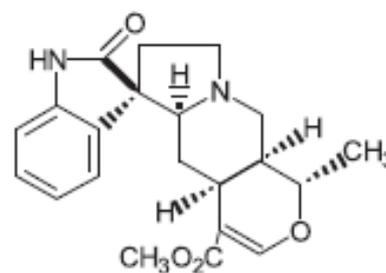
2- Mitrafilina



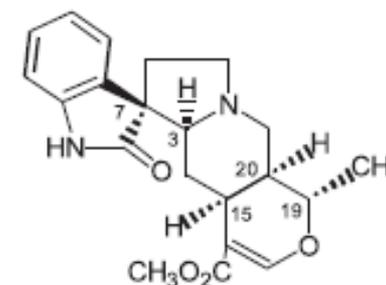
3- Uncarina F



4- Isomitrafilina



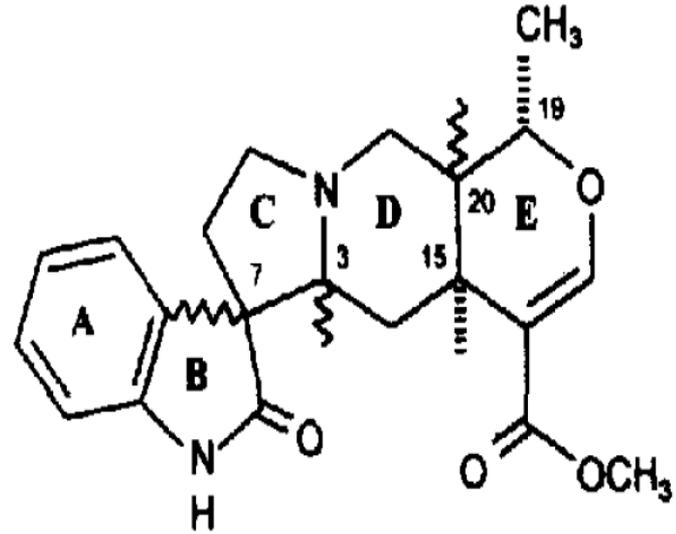
5- Pteropodina



6- Isopteropodina

Uncaria tomentosa Alcalóides

- Em folhas jovens há predominância de uncarina (4), especialmente na primavera e verão, enquanto nas folhas mais velhas o predomínio é dos os alcalóide pteropodina (1), isopteropodina (2) e speciofilina (3) (Laus et al., 1997).



1	3S, 7R, 15S, 19S, 20S
2	3S, 7S, 15S, 19S, 20S
3	3R, 7S, 15S, 19S, 20S
4	3R, 7R, 15S, 19S, 20S

Table 2. Alkaloid distribution in different parts of *Uncaria tomentosa* plants (Innsbruck, April 1994)*

	Young leaf	Mature leaf	Twig bark	Stem bark	Root
	mg alkaloid g ⁻¹ plant material				
<i>Plant no. 15</i>					
Pteropodine 1	2.8	→ 9.3	3.0	→ 0.05	1.1
Isopteropodine 2	1.9	4.1	0.63	0.06	0.57
Speciophylline 3	12.2	9.6	1.6	0.08	→ 2.1
Uncarine F 4	47.9	2.4	→ 0.63	0.03	0.91
Mitraphylline 5			0.50	0.03	1.6
Isomitraphylline 6		0.06		0.02	0.84
Akuammigine 11					
Total	64.8	25.5	6.4	0.27	7.1
<i>Plant no. 16</i>					
Pteropodine 1	3.1	5.2	1.7	0.32	1.5
Isopteropodine 2	0.89	1.9	0.54	0.23	0.65
Speciophylline 3	6.4	6.2	1.3	0.50	1.5
Uncarine F 4	18.3	1.5	0.39	0.22	0.50
Mitraphylline 5			0.55	0.30	1.6
Isomitraphylline 6					0.72
Akuammigine 11	1.7				
Total	30.4	14.8	4.5	1.6	6.5

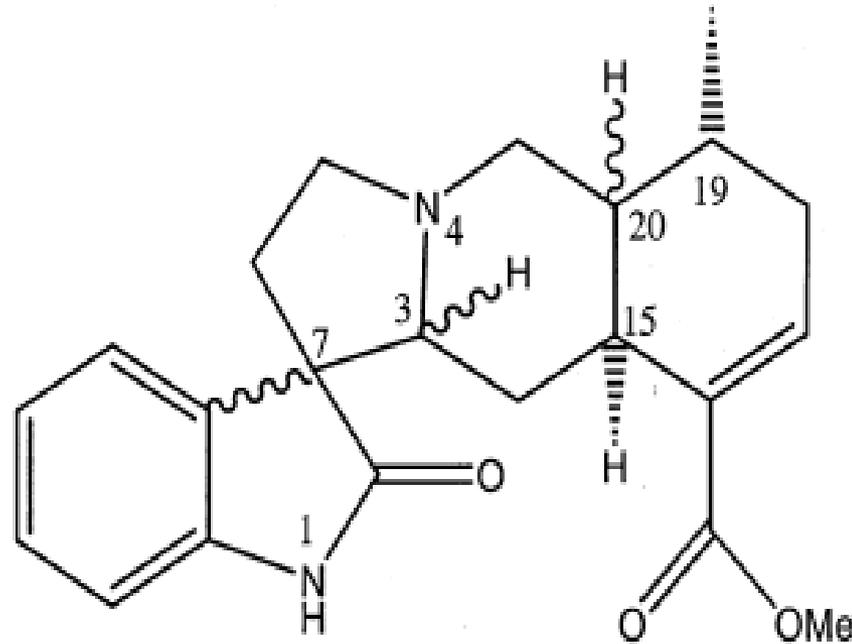
* No entry means that the corresponding alkaloid was not detected (< 0.01 mg g⁻¹).

Table 3. Seasonal variation of alkaloids in leaves of *Uncaria tomentosa* (Innsbruck)*

	Apr 94	Dec 94	Apr 95	May 95	Oct 95	Dec 95	Apr 96	May 96	Jul 96	Sep 96
Plant no. 16	mg alkaloid/g plant material									
<i>Young leaves</i>										
Pteropodine 1	3.1	3.8	11.5	7.1	8.2	†	1.1	4.7	2.7	4.0
Isopteropodine 2	0.89	2.3	4.2	2.2	2.6		1.3	1.8	1.7	1.4
Speciophylline 3	6.4	13.4	14.0	13.7	9.4		8.5	6.5	7.4	8.3
Uncarine F 4	18.3	7.4	64.4	44.6	2.2		25.9	29.6	39.8	15.2
Mitraphylline 5					0.02					
Isomitraphylline 6					0.10					
Akuammigine 11	1.7	0.75	15.8	10.8			2.1	3.1	6.8	1.5
Tetrahydroalstonine 12			4.1	3.5			0.15		1.2	0.1
Total	30.4	27.7	114.0	81.9	22.5		39.1	45.7	59.6	30.5
<i>Mature leaves</i>										
Pteropodine 1	5.2	5.3	5.1	5.3	8.0	5.6	6.4	4.9	4.5	5.9
Isopteropodine 2	1.8	3.3	3.4	2.4	0.38	3.2	3.8	1.7	3.8	3.3
Speciophylline 3	6.2	12.7	12.0	15.2	8.9	9.6	9.4	11.5	10.8	11.0
Uncarine F 4	1.5	2.4	3.6	4.4	1.7	2.3	2.6	3.7	3.3	2.6
Isomitraphylline 6					0.28					
Akuammigine 11				0.44				0.33	0.45	0.04
Total	14.7	23.7	24.1	27.7	19.3	20.7	22.2	22.1	22.9	22.8

* No entry means that the corresponding alkaloid was not detected ($<0.01 \text{ mg g}^{-1}$).

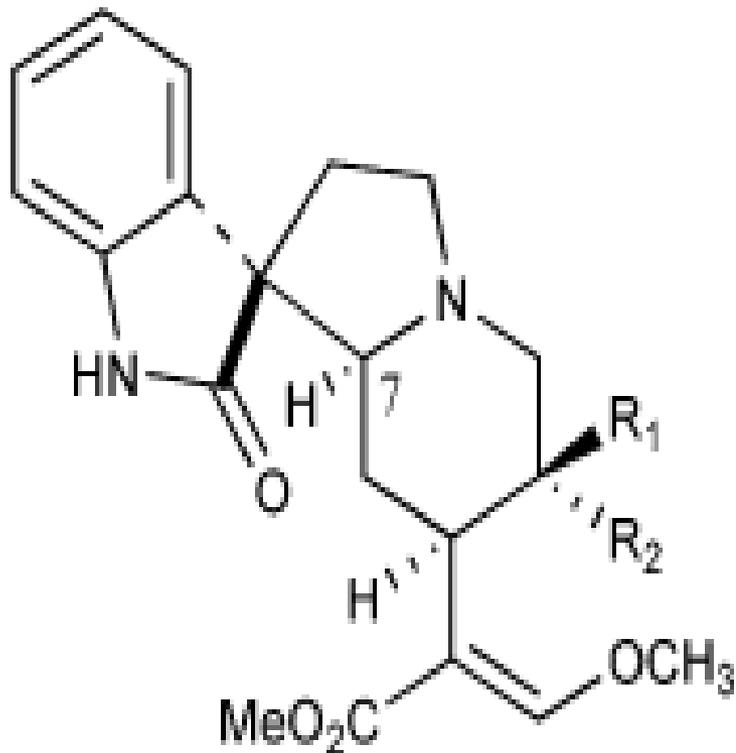
***Uncaria tomentosa*- Alcalóides**



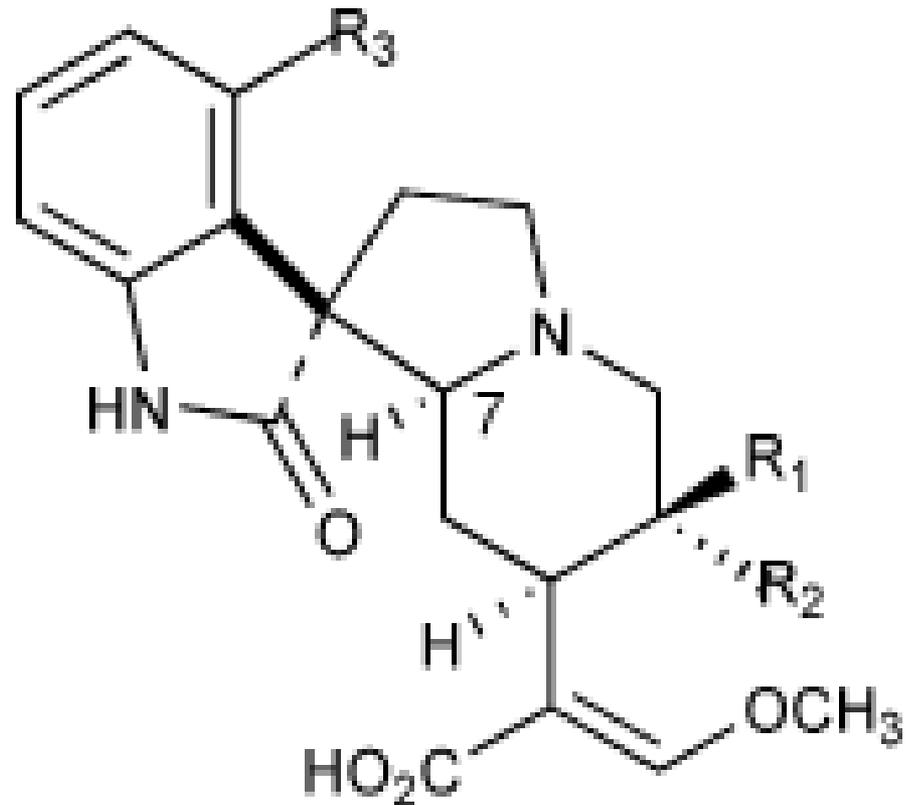
Mitranfilina 3S,7R,15S,19S,20R

Isomitrafilina 3S,7S,15S,19S,20R

Uncaria tomentosa- Alcalóides

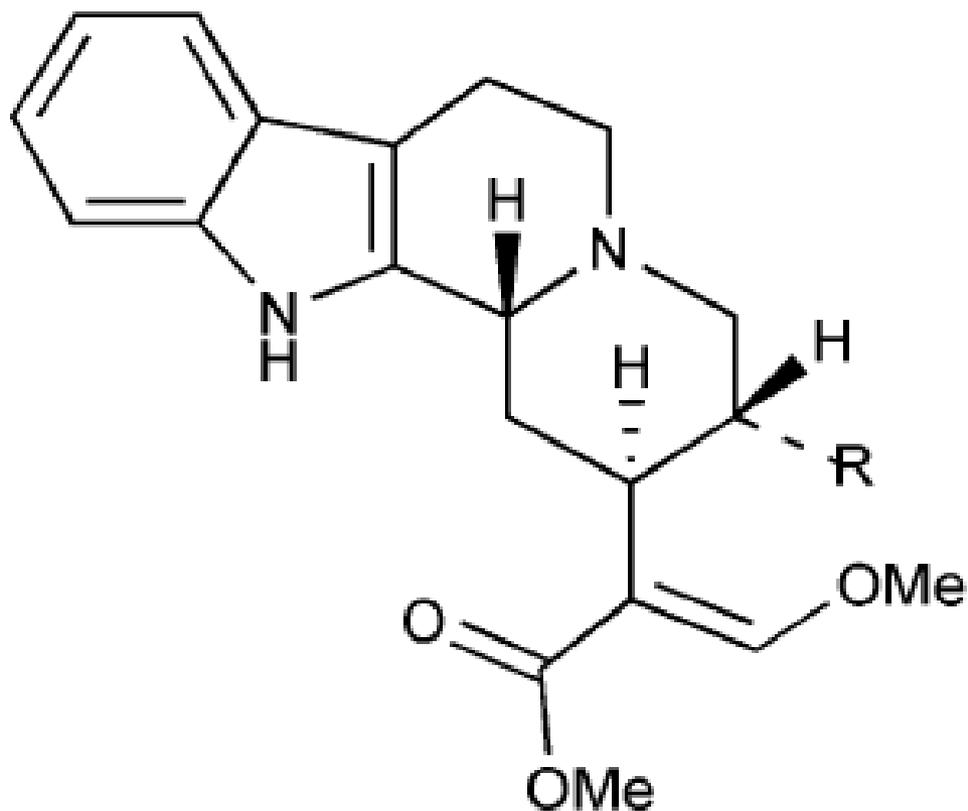


Rinchofilina: R₁ = H R₂ = Et



Isorinchofilina: R₁ = H R₂ = Et R₃ = H

***Uncaria tomentosa*- Alcalóides**

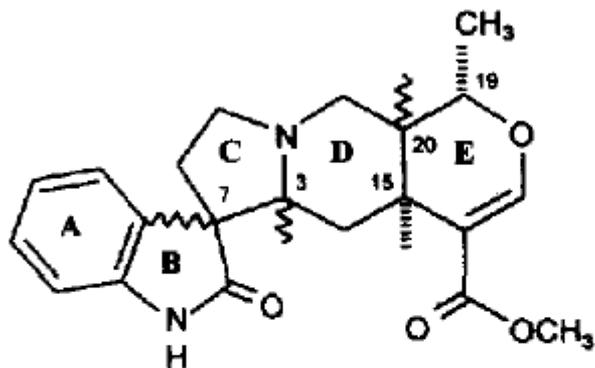


Hirsuteina R=CH=CH₂

Hirsutina R=Et

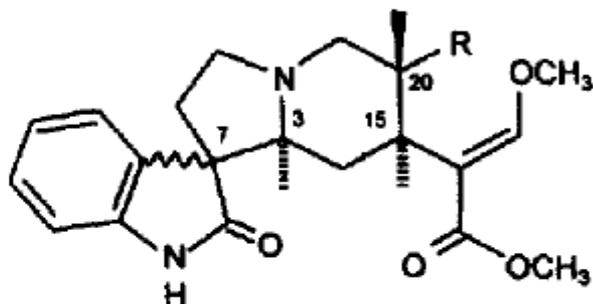
Alkaloids of Peruvian *Uncaria tomentosa*

Alcalóides Penta e tetracíclico oxindole



1-6

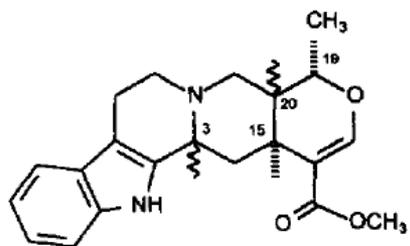
1	3S, 7R, 15S, 19S, 20S
2	3S, 7S, 15S, 19S, 20S
3	3R, 7S, 15S, 19S, 20S
4	3R, 7R, 15S, 19S, 20S
5	3S, 7R, 15S, 19S, 20R
6	3S, 7S, 15S, 19S, 20R



7-10

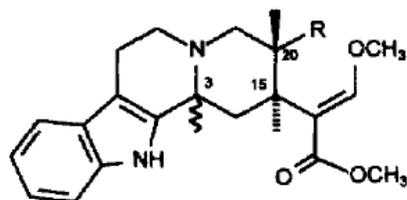
7	3S, 7R, 15S, 20R	R=ethyl
8	3S, 7S, 15S, 20R	R=ethyl
9	3S, 7R, 15S, 20R	R=vinyl
10	3S, 7S, 15S, 20R	R=vinyl

- Pteropodine 1
- Isopteropodine 2
- Speciophylline 3
- Uncarine F 4
- Mitraphylline 5
- Isomitraphylline 6
- Rhynchophylline 7
- Isorhynchophylline 8
- Corynoxene 9
- Isocorynoxene 10
- Akuammigine 11
- Hirsutine 14
- Dihydrocorynantheine 15
- Hirsuteine 16



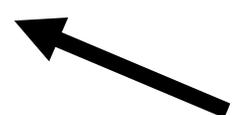
11-13

11	3R, 15S, 19S, 20S
12	3S, 15S, 19S, 20S
13	3R, 15S, 19S, 20R



14-17

14	3R, 15S, 20R	R=ethyl
15	3S, 15S, 20R	R=ethyl
16	3R, 15S, 20R	R=vinyl
17	3S, 15S, 20R	R=vinyl



alcalóide indólico

Extração ácido-base

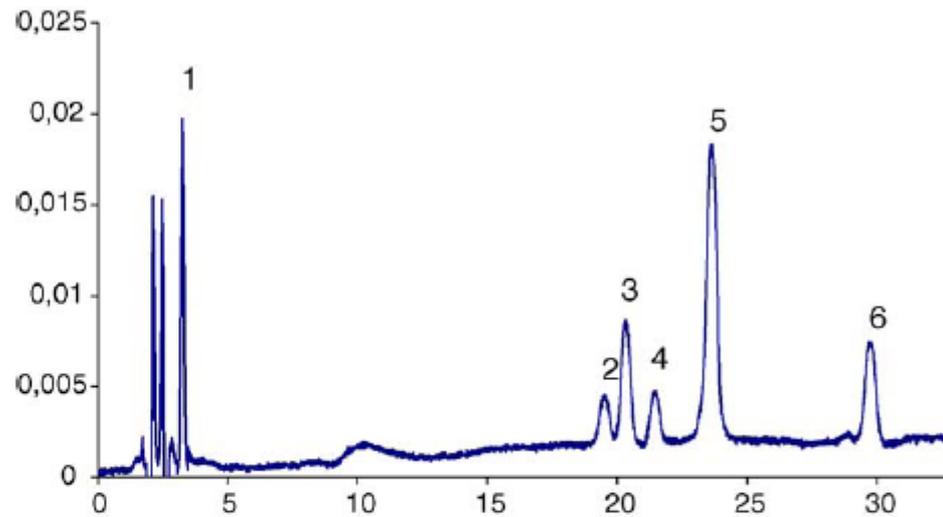


Fig. 1. HPLC-fingerprint analysis of the studied bark of *Uncaria tomentosa*.

Table 1

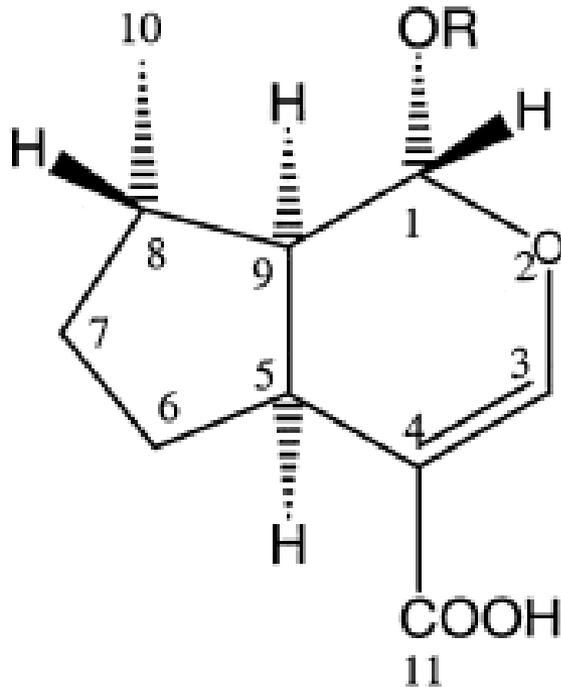
Content of alkaloids in 100 g of the bark from *Uncaria tomentosa* [mg]

Peak no.	Alkaloid	Content
1	Coffeine ^a	–
2	Uncarine F	67.16
3	Speciophylline	115.25
4	Mitrephylline	67.01
5	Isomitraphylline/pteropodine	371.39
6	Isopteropodine	104.44

The total amount of the main alkaloids is 725.34 mg (~0.72%).

^a Internal standard.

Uncaria tomentosa

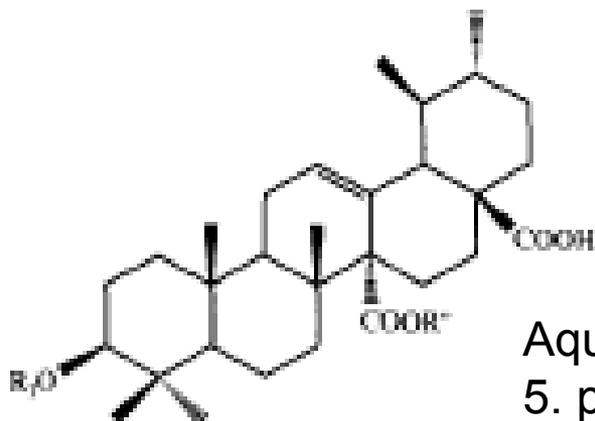
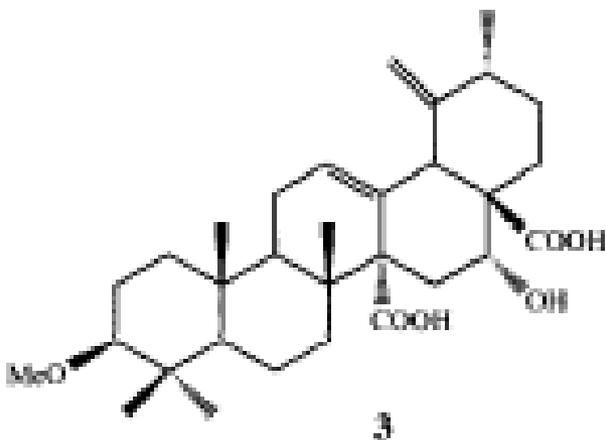
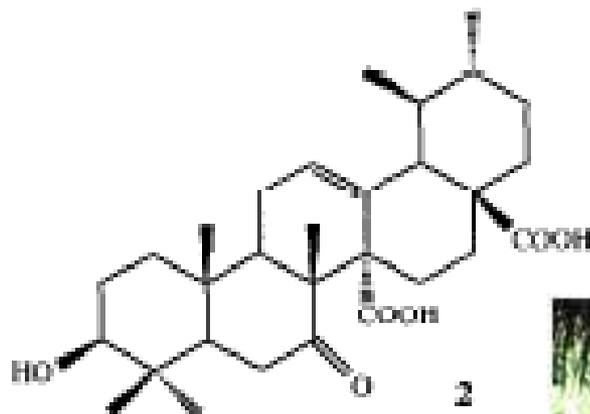
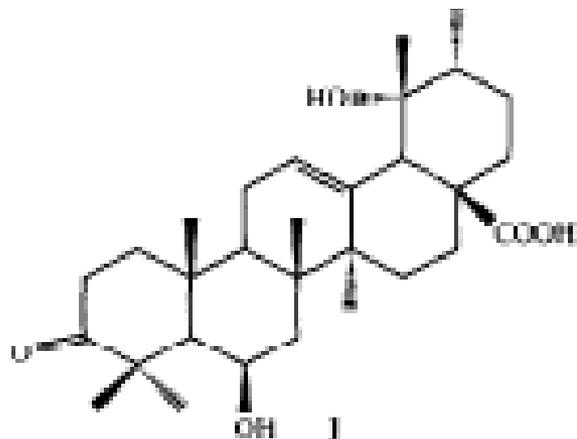


1-Acido deoxiloganico
2-β-sitosteril glucosideo,

1 R=Glc

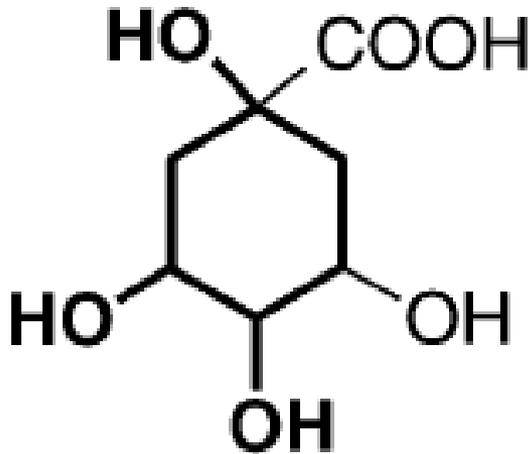
2 R=Glc(Ac)₄

Triterpenos polioxigenados



Aquino et al., *Phytochemistry*. Vol 45. No. 5. pp 3035-1040. 1997

Uncaria tomentosa



Quinic acid

Extrato aquoso de *Uncaria tomentosa* apresenta atividade antiinflamatória, estimuladora do sistema imunológico e preventivo contra diversos tipos de câncer, essas ações tem sido atribuídas a presença do ácido quínico.

Efeito antiinflamatório do extrato **glicólico** de *U. tomentosa*



Pata do animal inflamada por administração de carragenina

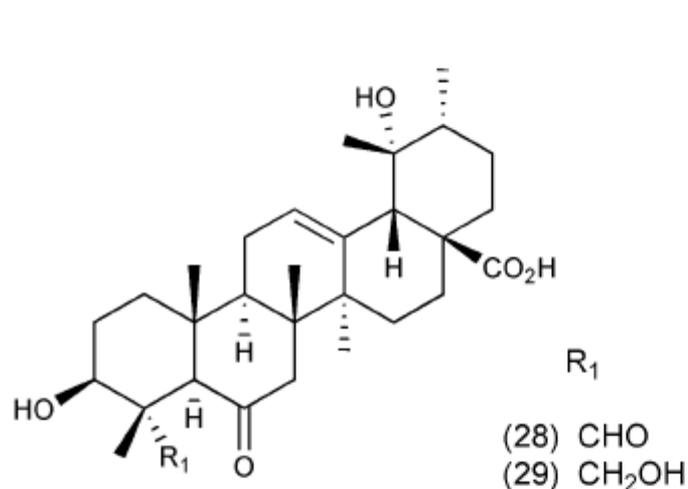


Efeito antiinflamatório do extrato de *U. tomentosa*



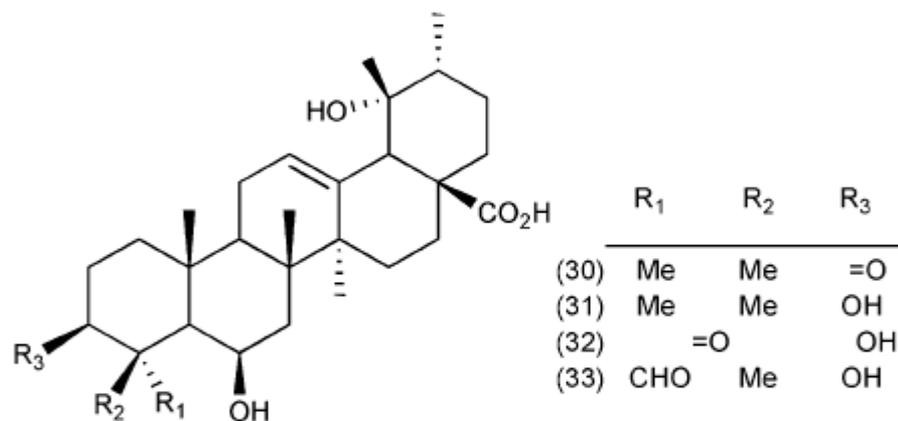
Presença de saponinas no extrato de *U. tomentosa*

Uncaria tomentosa



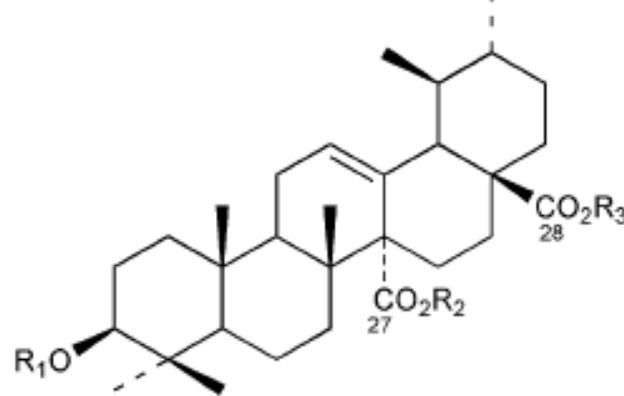
2-28 3, 19 -dihydroxy-6-oxo-urs-12-en-23-al-28-oic acid

2-29 3, 19 -dihydroxy-6-oxo-urs-12-en-23-ol-28-oic acid



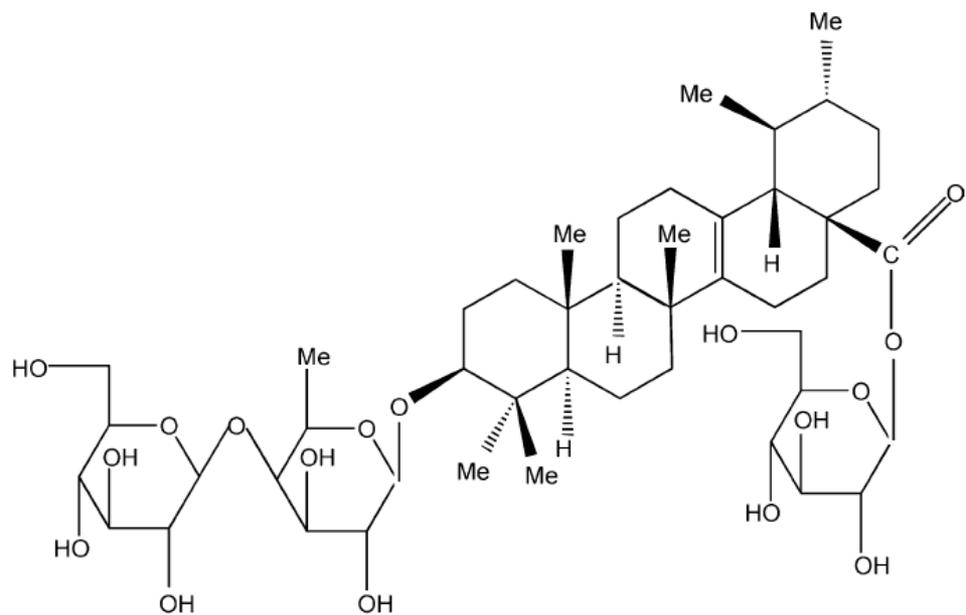
2-32 3, 6, 19 -trihydroxy-23-oxo-urs-12-en-28-oic acid

2-33 23-nor-24-esomethylene-3, 6, 19 -trihydroxyurs-12-en-28 -oic acid

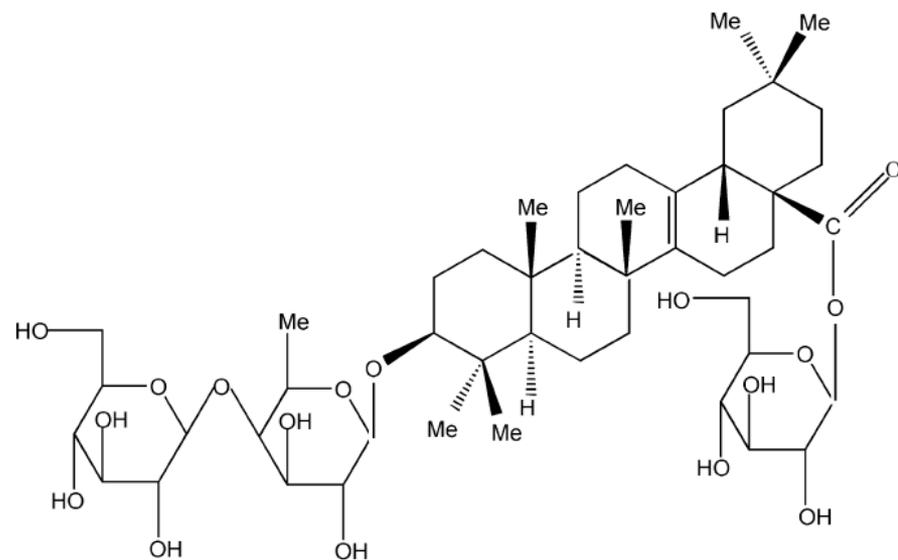


	R_1	R_2	R_3
2-39	3 -O- -D-quinovopyranosyl	H	H
2-40	3 -O- -D-fucopyranosyl	-D-glucopyranosyl	H
2-41	3 -O-[-D-glucopyranosyl-(1 → 3)- -D-fucopyranosyl]	-D-glucopyranosyl	H
2-42	3 -O-[-D-glucopyranosyl-(1 → 3)- -D-fucopyranosyl]	H	-D-glucopyranosyl
2-43	3 -O-[-D-glucopyranosyl-(1 → 3)- -D-fucopyranosyl]	H	H
2-44	3 -L-rhamnopyranosyl →	H	H
2-45	3 -L-rhamnopyranosyl-(3 → 1)- -D-glucopyranosyl	H	H
2-46	3 -D-quinovopyranosyl-(3 → 1)- -D-glucopyranosyl	H	H
2-47	3 -D-quinovopyranosyl-(3 → 1)- -D-galactopyranosyl	H	H
2-48	3 -L-rhamnopyranosyl-(3 → 1)- -D-glucopyranosyl	-D-glucopyranosyl	H
2-49	H →	-D-glucopyranosyl	H

Uncaria tomentosa

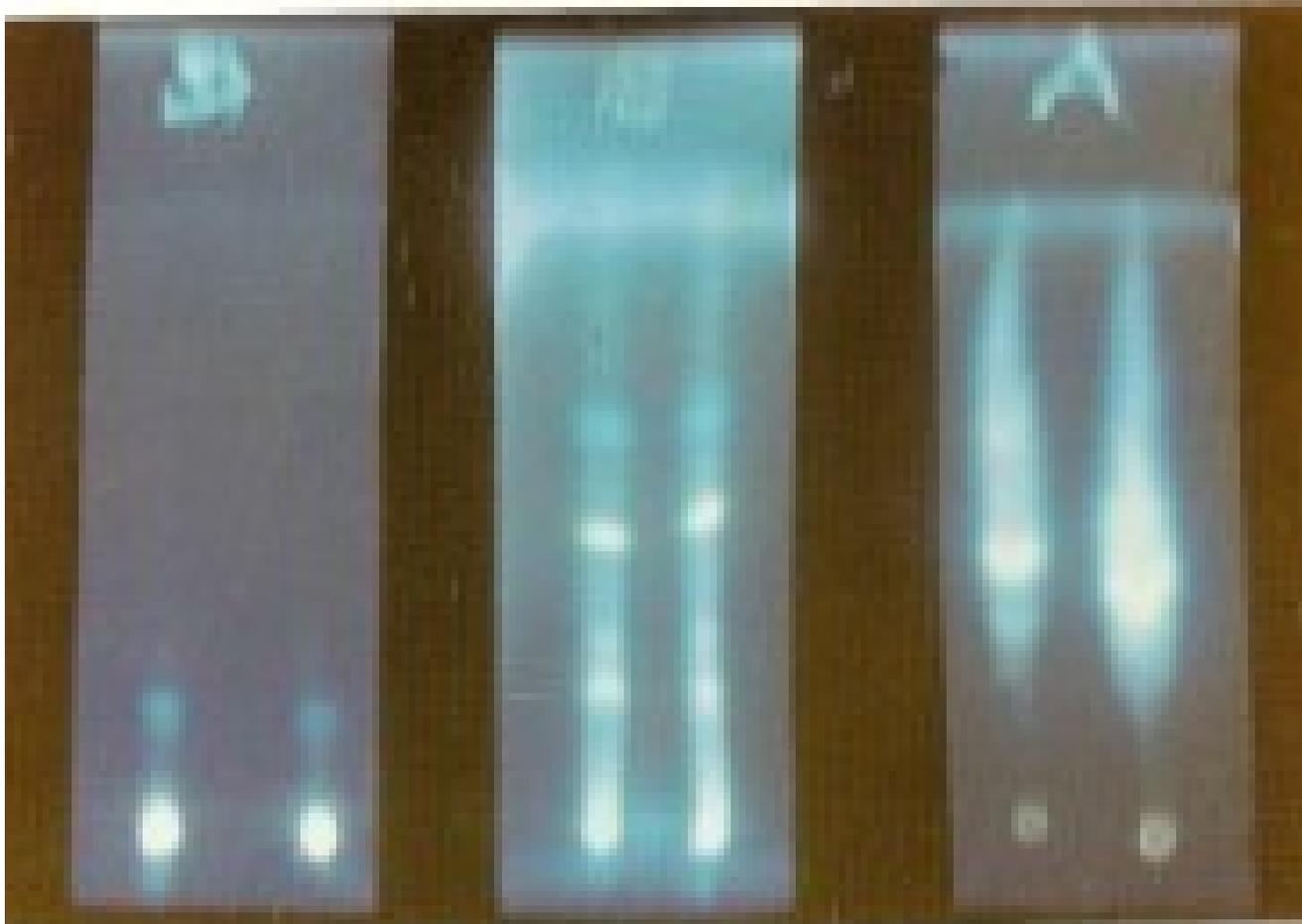


2-52 Tomentoside A



2-53 Tomentoside B

Controle de qualidade- cromatograma



A) flavonóides, B) taninos e C) triterpenos e esteróides

Tropismo: sistema osteoarticular e imunológico

