

Curare

Zeitschrift für Medizinethnologie • Journal of Medical Anthropology

hrsg. von/edited by: Arbeitsgemeinschaft Ethnomedizin e.V. – AGEM

**Ethnobotanical Contributions
to Medical Anthropology**

**Beiträge aus der Ethnobotanik
zur Medizinethnologie**

- **Ayahuasca in Urban Circuit**
- **Peyote as Medicine**
- **Entheogens in Focus**
- **Ethnobotanical Title Pictures
in *Curare***

- **Die Ayahuasca-Liane**
- **Der Peyote-Kaktus**
- **Entheogene**



Zum Titelbild/Front picture *Curare* 37(2014)3:

Nothofagus antarctica (G. Forst) Oerst [antarktische Scheinbuche]. Detail of a Herbal Specimen of the Georg Forster Collection, by courtesy of "Herbarium, Botanischer Garten und Botanisches Museum Berlin-Dahlem, Freie Universität Berlin" © see complete document and more p.179f.

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Zeitschrift für Medizinethnologie Journal of Medical Anthropology



Herausgeber / Editor-in-Chief im Auftrag der / on behalf of:

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IMPRESSUM *Curare* 37(2014)3**Verlag und Vertrieb / Publishing House:**

VWB – Verlag für Wissenschaft und Bildung, Amand Aglaster
Postfach 11 03 68 • 10833 Berlin, Germany
Tel. +49-[0]30-251 04 15 • Fax: +49-[0]30-251 11 36
e-mail: info@vwb-verlag.com
<http://www.vwb-verlag.com>

Bezug / Supply:

Der Bezug der *Curare* ist im Mitgliedsbeitrag der Arbeitsgemeinschaft Ethnomedizin (AGEM) enthalten. Einzelne Hefte können beim VWB-Verlag bezogen werden • *Curare* is included in a regular membership of AGEM. Single copies can be ordered at VWB-Verlag.

Abonnementspreis / Subscription Rate:

Die jeweils gültigen Abonnementspreise finden Sie im Internet unter • Valid subscription rates you can find at the internet under: www.vwb-verlag.com/reihen/Periodika/curare.html

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ISSN 0344-8622

ISBN 978-3-86135-779-7

Die Artikel dieser Zeitschrift wurden einem Gutachterverfahren unterzogen • This journal is peer reviewed.



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edited by / herausgegeben von:
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Redaktionsschluss: 30.11.2014

Lektorat und Endredaktion: EKKEHARD SCHRÖDER und LISA MÄRCZ (Praktikum)

Die Artikel der *Curare* werden einem Reviewprozess unterzogen / The journal *Curare* is a peer-reviewed journal

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The famous wooden carved anthropomorphic Mandragora figures of “The grete herball” from Peter Treveris, London 1526, which were used frequently as logo in AGEM-publications.

Herbal Treatments for Bites of Viperidae in Western Niger

TILMAN MUSCH

Abstract Envenomation symptoms of bites by *Bitis arietans* and *Echis leucogaster* with regard to their possible variability were studied among Zarma and Tuareg in Western Niger. *Annona senegalensis*, *Combretum glutinosum*, *Commiphora africana* and *Entada africana* were determined as relevant in treatments. The importance of plants with possible haemostatic, cardio-active and analeptic as also anti-inflammatory, antiseptic and diuretic properties is shown.

Keywords snakebite – healing plant – African puff adder – White bellied carpet viper – Zarma – Tuareg – Niger

Heilpflanzen gegen Vipernebisse in West-Niger

Zusammenfassung Es wurden Vergiftungssymptome bei Bissen durch *Bitis arietans* und *Echis leucogaster* mit Hinblick auf deren mögliche Variabilität bei Zarma und Tuareg in Westniger untersucht. *Annona senegalensis*, *Combretum glutinosum*, *Commiphora africana* und *Entada africana* wurden dabei als relevante Heilpflanzen identifiziert und deren mögliche blutstillenden, herz- und atmungsbelebenden, entzündungshemmenden, antiseptischen und diuretischen Eigenschaften hervorgehoben.

Schlagwörter Schlangenbiss – Heilpflanze – Puffotter – Weißbauch-Sandrasselotter – Zarma – Tuareg – Niger

Résumé français p. 264

1. Introduction

Considering the high cost of the modern immunotherapy, “traditional” treatments of snakebites are the only affordable possibility of healing for many people. A better knowledge of such treatments could allow improving them and making them accessible for a wider range of persons. By studying *local* representations of Viperidae envenomations and plants used for their healing in Western Niger, the communication tries to adopt an approach relating social anthropology with ethnopharmacological evidences.

2. Methods

The research was carried out in the neighboring settlements of Tilobi and Tegalallen located on a rocky plateau in the south of Filingué/Western Niger.¹ The research area in a fossil valley named Dallol Bosso belongs to the Sahelian belt and has mostly shrubby vegetation. The area is inhabited by Zarma and highly assimilated Tuareg.

In matters of snakebites, people appeal to specialized healers.² As their number is very limited (altogether five healers could be identified in the

area), choosing a random sample for ethnobotanical research among the whole population (MARTIN 1995: 97ff, ALEXIADES 1996: 77f) would not make sense. In order to provide scientifically reliable data, all the five healers were interviewed. Later on, they were also questioned about plants used by their respective colleagues but not by themselves. Such “triangulation” (FLICK 2009: 53f) shall allow counterchecking results where it is not possible to realize quantitatively important samples.

In order to discuss the matter with the informants, “semi-structured interviews” (ALEXIADES 1996: 63, MARTIN 1995: 110ff) leading to “open-ended conversation[s]” (MARTIN 1995: 109f) were made. Questions were asked on how snake venoms are acting on the human organism and on how bites can be treated. Plants relevant for healing were scientifically determined in situ in the presence of the informants.

3. Theory

The effectiveness of several plant species in treatments of snakebites has been discussed by medical or phytopharmacological studies as also in reviews of already published data (cf. among others ADZU

et al. 2005; CHIPPAUX *et al.* 1997, 2001; HOUGHTON & OSIBOGUN 1993; MARTZ 1992). Such treatments are often symptomatic ones, using the pharmacological properties of herbs in order to reduce clinically observable troubles appearing during the envenomation. Researched symptomatic effects of herbal treatments relevant in snakebites are anti-inflammatory (glycosides, flavonoids, saponins, tannins)³, analgesic, antiseptic (triterpenes, tannins), sedative, haemostatic (glycosides, tannins), analeptic, anti-spasmodic (flavonoids), cardio-active (glycosides, steroids) and diuretic (flavonoids, saponins) ones. This communication presents four plants used in treatments for Viperidae bites in Western Niger. The aim is however not only to discuss phytochemistry with reference to relevant studies in the field, but to propose a new approach by linking the former with *local* representations of “illnesses” caused by the bites. Only with such an approach, one can take into account possible variability of venoms and thus understand the importance of the respective plants and their phytochemical substances.

4. Results

Two species of Viperidae were identified as relevant by the informants: *Bitis arietans* and *Echis leucogaster*.⁴

Bitis arietans. The informants mentioned unanimously the hemorrhagic effect of the venom: Mucosa in mouth and nose are bleeding and the victim is vomiting blood. Necrosis is also mentioned, but in a much lesser degree. An image used by every interviewed person is that of blood which exits “from any pores where hair is crowing on the body”.⁵

Symptoms provoked by the cytotoxic and haemotoxic venom are globally described as intense pain, bleeding, swelling, blistering and local necrosis (PHELPS 2010: 270). The informant’s main focus on bleeding is interesting, as, according to scientific reports from West Africa, the venom of *B. arietans* provokes in particular important necroses and (sometimes monstrous) edema (cf. LE DANTEC *et al.* 2004, MION *et al.* 2002).⁶

Echis leucogaster. According to the healers, envenomation can provoke localized edema, necrosis and bleeding, in particular of the nasal mucosa. A very salient symptom constitute, for them, cardiac

problems followed by asphyxia: “The heart will close, the person cannot breathe”.⁷

No scientific information exists for the venom of *E. leucogaster* (PHELPS 2010: 386). Another species, *E. ocellatus*, which is living very closely to *E. leucogaster* but which prefers more humid places, is, as for the symptoms provoked by its bite, often compared to the latter. Several authors report persistent and abnormal bleeding, hemorrhages, non clotted blood and death from bleeding for *E. ocellatus*, but no cardiac problems and asphyxia, as described by the informants (cf. CHIPPAUX *et al.* 1999, EINTERZ & BATES 2003, PUGH *et al.* 1979).⁸

According to the informants, the following listed plants are used for bites by *Bitis arietans* [1, 2, 4] and *Echis leucogaster* [2, 3, 4]. Treatments are at the same time internal and external ones, and in the majority of the mentioned cases the same remedy is both applied on the wound and taken (with water or curdled milk) by the patient.

[1] *Annona senegalensis* (Annonaceae; root, seed). Alkaloids, tannins and saponins are present in the bark (PERSINOS & QUIMBY 1967). Saponins, steroids, flavonoids and glycosides were found in seed (YISA *et al.* 2010). Rutin, quercetin and quercitrin were detected in the leaves (MACKIE & MISRA 1956).

[2] *Combretum glutinosum* (Combretaceae; root, trunk bark). Tannins are present in the leaves (JOSANG *et al.* 1994). Extracts of the whole plant contain tannins, saponins, phenols, flavonoides, glycosides, alkaloids and anthraquinone (YAHAYA *et al.* 2012).

[3] *Commiphora africana* (Burseraceae; trunk bark). The stem bark contains alkaloids, tannins, flavonoids, steroids and saponins (GOJI *et al.* 2009). Triterpenes were found in the oleo-gum resin of the bark (BOITEAU *et al.* 1964: 815).

[4] *Entada africana* (Mimosoideae; trunk bark, leaves). Saponins and tannins are present in the trunk bark (GITHENS 1949: 87). The root contains several saponins (CIOFFI *et al.* 2006). Rotenone was found in the plant (GAUDIN & VACHERAT 1938).

5. Discussion

According to the informants, the hemorrhagic symptom is provoked by bites of both mentioned species, but it is particularly salient for *Bitis arietans*. The venom of *Echis leucogaster* is affecting heart and respiration. These local descriptions are

slightly modifying scientific ones. The latter are contributing a mostly necrotic and edema provoking action to the venom of *B. arietans* and don't mention the possible cardiac and respiratory effects of the venom of *Echis sp.* The fact that the informants emphasize in particular the hemorrhagic symptom for *B. arietans* may be explained by possible geographic and intra-subspecies-variability of snake venom (CHIPPAUX *et al.* 1991; CURRIER *et al.* 2010). The differences in the case of *Echis sp.* may be explained by intraspecific variability.

The healers mentioned four species of plants relevant for the treatment of bites by Viperidae: *Entada africana* (mentioned by four persons), *Annona senegalensis* (three), *Combretum glutinosum* (three), *Commiphora africana* (two). When questioned on plants used by their colleagues, the healers confirmed mostly their respective relevance but underlined the fact that several different treatments were possible. In some cases species are combined for a remedy. *Entada africana* was presented three times as a general "antidote": "It impeaches the poison to mount" up to the heart".⁹

When establishing relationships between the bite symptoms and phytochemical properties, one can state the following.

In the case of bites by *Bitis arietans* (mostly hemorrhagic symptom), the healers use plants the chemical compounds of which may have haemostatic effects (tannins, glycosides): *Annona senegalensis* as also *Combretum glutinosum* and *Entada africana*. When bites of *Echis leucogaster* occur (hemorrhagic symptoms, dolor of heart, problems of respiration), plants containing possible haemostatic (glycosides, tannin) and cardio-active (glycosides, steroids) substances are used: *Combretum glutinosum*, *Commiphora africana* and *Entada africana*. All of the used plants contain also substances with probable anti-inflammatory, anti-septic and diuretic properties.

6. Conclusion

Healing snakebites does not only mean the treatment of symptoms, but may also include an intervention of phytochemical substances as systemic or specific antidotes (CHIPPAUX 2002: 138ff). This mode of action is of course very difficult to determine and needs rigorous experimental studies which have, for example, been done by KONÉ (1980) for *Securidaca*

longepedunculata. Research as the present one can be a first step towards such studies as it identifies plants useful for symptomatic treatments but which may also contain antidotal substances. The search for natural antidotes could be a future perspective of ethnopharmacological research on snakebites.

7. Glossary

Annona senegalensis: mufa (Zarma) / temakadet (Tamashek)

Combretum glutinosum: kokorbe / takalafat

Commiphora africana: korombe / adaras (darakasa)

Entada africana: batala / batala.

Notes

1. Tilobi is located around N 14° 07.275', O 003° 09.087' (227 m), and Tegalallen slightly north-westwards of N 14° 03.727', E 003° 12.756' (238 m). Each of the settlements includes several hamlets. Both together have about 1.400 inhabitants.
2. Healers are called *zima* (Zarma language) and have a special relationship with spirits conferring them the knowledge of plants and healing (ROUCH 1989: 56ff, 204ff).
3. Phytochemical substances contributing probably to the respective effect were given in brackets (cf. CHIPPAUX 2002: 136ff).
4. *Bitis arietans* is called *kassa* (Zarma) or *ta-kuskus* (Tamashek). The Tamashek name as probably also the Zarma one are onomatopoeias alluding to the hissing of the snake. The names of *Echis sp.* are describing the noise of the snake's scales which is said to be similar to trickling millet (Zarma: *hayni dooru* = "pour millet"; Tamashek: *ta-masangu* = "that one from the millet grains").
5. *Naj kullu kan hamni fune go ni ga hamu ga i ga kande kuri* (Zarma as also in the following).
6. These reports concern in particular West African cases. The species is however highly adaptative and occurring in a wide range of habitats in Africa. Venom variability can be found in specimens from different geographical regions as also within groups living in similar habitats. Due to these facts, *Bitis arietans* may be considered as a "collection of subpopulations" resulting from different evolutionary pressure (CURRIER *et al.* 2010).
7. *Bina ga daabu, boro si hin ka fulanzam.*
8. The healers distinguish the two species by the coloration of their ventral face, but *E. ocellatus* seems not to be relevant in the area.
9. *Ga gandi naadjo mukoy beene.*

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Manuscript received: June 3, 2013
 Manuscript accepted: June 28, 2013



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ISSN 0344-8622 26(2003)3

CULTURE

Zeitschrift für Ethnomedizin und transkulturelle Psychiatrie
Journal of Medical Anthropology and Transcultural Psychiatry

hrsg. vor/edited by: Arbeitsgemeinschaft Ethnomedizin e.V. - AGEM

Neue Trends in der Ethnobotanik und Ethnopharmakologie /
New Trends in Ethnobotany and Ethnopharmacology

Berichte
Buchbesprechungen
Dokumentation
Zeitschrift
Etiologia




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ISSN 0344-8622 24(2001)1+2

CULTURE

Zeitschrift für Ethnomedizin und transkulturelle Psychiatrie
Journal for Ethnomedicine and Transcultural Psychiatry

Arbeitsgemeinschaft für Ethnomedizin e.V. (Hg.) / Society for Ethnomedicine Inc.



Ethnomedizin 2001: Rückblicke, Einblicke, Ausblicke
Ethnomedicine 2001: Looking back and forward

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ISSN 0344-8622 34(2011)1+2

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Zeitschrift für Medizinethnologie • Journal of Medical Anthropology

hrsg. vor/edited by: Arbeitsgemeinschaft Ethnomedizin e.V. - AGEM

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Selected Contributions of the 4th Colloquium of ESE /
29th Conference of AGEM,
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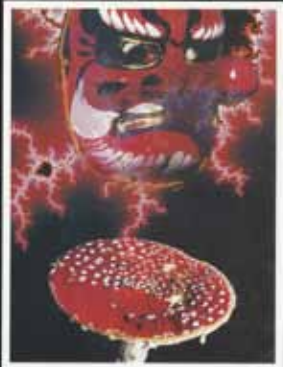
ISSN 0344-8622 18 (1995) 1

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Zeitschrift für Ethnomedizin • Journal for Ethnomedicine

Arbeitsgemeinschaft Ethnomedizin e.V. (Hg.) • Society for Ethnomedicine Inc. (Ed.)

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