Available online at www.sciencedirect.com
SCIENCE DIRECT®
Journal of Ethnopharmacology 93 (2004) 231–241
Journal of ETHNO-PHARMACOLOGY
www.elsevier.com/locate/jethpharm

Animal and plant poisons and their antidotes in Eseka and Mbalmayo regions, Centre Province, Cameroon

E. Noumi*

Laboratory of Plant Biology, Higher Teachers' Training College, University of Yaounde I, P.O. Box 47, Yaounde, Cameroon

Received 30 September 2002; received in revised form 30 March 2003; accepted 12 March 2004

Available online 1 June 2004

Abstract

This work reports 16 plant and 7 animal species which produce poisons and 13 plant and 1 animal species, which produce antidotes, recorded in two divisions of Centre Province, Cameroon.

Keywords: Poisons; Antidotes; Centre Province; Cameroon

1. Introduction

Centre Province, one of the 10 provinces of Cameroon, has a surface area of 69,035 km^2 and is divided into eight administrative divisions. The Nyong-et-Kellé and Nyong-et-So divisions of this province are the area in which the present study was conducted. The Nyong-et-Kellé is the homeland of the Bassa tribe and Nyong-et-So, the homeland of the Ewondo subtribe of the Beti tribe. Hunting, fishing, gathering and subsistent traditional agriculture are the primary means of livelihood of these tribes.

Ethnobotany and ethnozoology have been in practice among these tribes with special reference to medicine, hunting and fishing through the use of poisonous extracts of plant and animal origins. Ethnobotanical studies have been carried out in the forest region in Cameroon (Cousteix, 1961; Esso et al., 1984; Kingue Kwa et al., 1994; Adjanahoun et al., 1996; Noumi et al., 1998; Noumi and Yomi, 2001), but no study of these tribes has been made on the plant and animal poisons and their antidotes. The objective of this work, therefore, was to make an inventory of the animals and plants that produce poisons on the one hand, and plants and animals that produce the antidotes on the other, which are known and used by Bassa and Ewondo people who occupy the study site.

The adverse effects of each poison to health are reported, as well as the therapeutic effects of their antidotes. The latter is highlighted as possible first aid to victims before they are taken to the hospital. An attempt is also made to examine the relationship between people and poison within the social framework.

2. Study area

The study region (Fig. 1), covers an area of 9940 km^2 and is criss-crossed by the river Nyong and its tributaries the Kellé and Maloumé to the South and the river Sanaga to the North.

The population of this region was estimated at 194,299 in 1987, representing 11.76% of the population of the province and 1.85% of the total population of Cameroon (Cameroun/FNUAP, 1987). The people of this region maintain a distinct culture through their languages (Bassa and Ewondo), food habits, socio-religious taboos, and beliefs.

The climate is equatorial with average annual rainfall, temperature and humidity of 2500 mm, 25 °C and 79.6%, respectively. The forests are generally evergreen, and of secondary type. The study area comprises Messondo, Eseka and Makak subdivisions in the Nyong-et-Kellé, as well as Ngomedzap and Mbalmayo subdivisions in the Nyong-et So (Fig. 1).

3. Methodology

The target population in this study consisted of persons living within the study area, ranging in age from 40 years and above, and who are herbalists and traditional healers, from different socio-cultural backgrounds. Information on

* Fax: +237-22-49-34.
E-mail address: noumikap@yahoo.fr (E. Noumi).

0378-8741/$ – see front matter
doi:10.1016/j.jep.2004.03.018

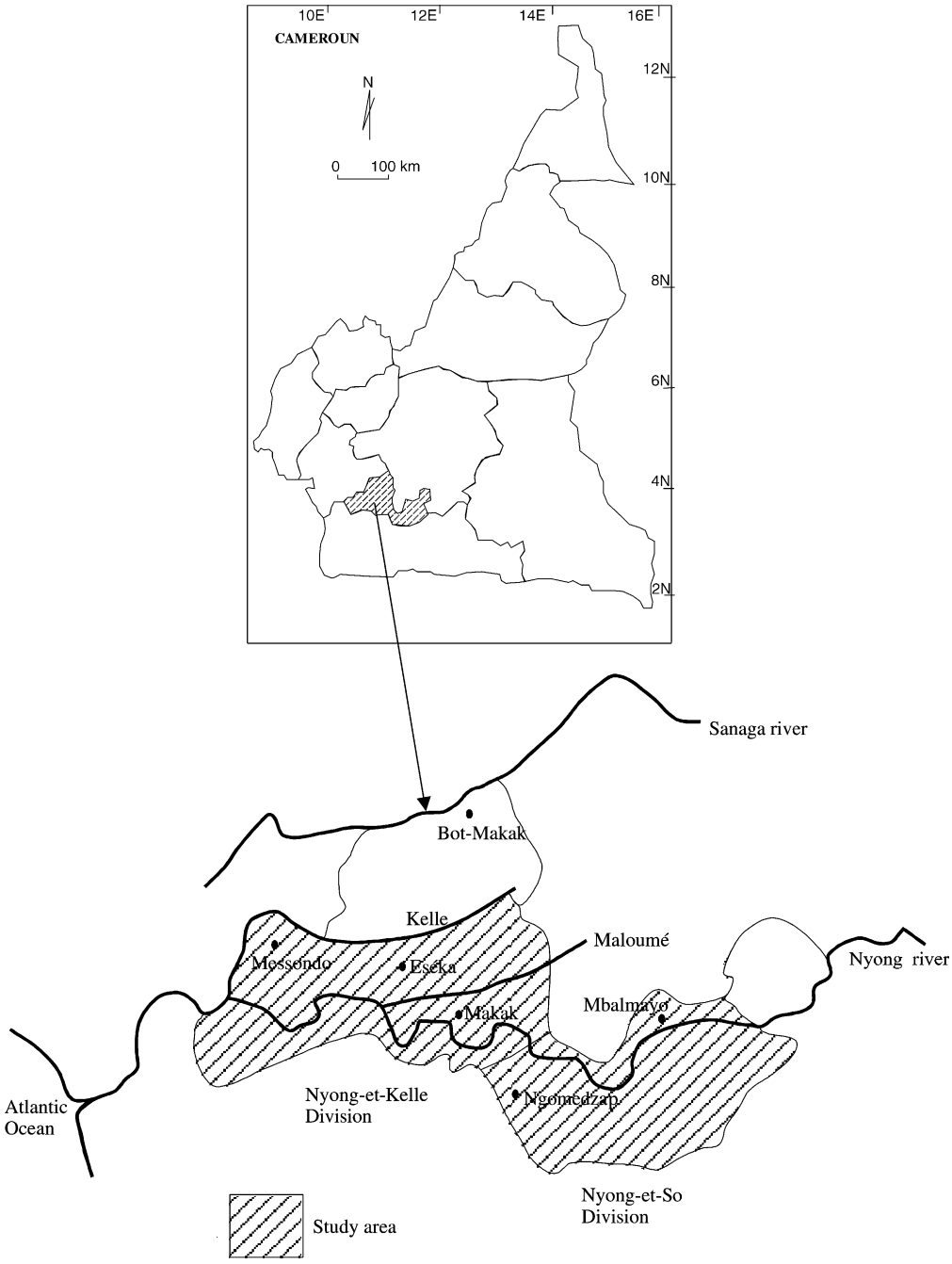

Fig. 1. Study area in the Nyong-et-Kellé and Nyong-et-So divisions.

the poisons and their antidotes was obtained through the use of a multiple choice questionnaire designed by the author. The questionnaire was distributed to participants between 1997 and 1999. The objectives of the study, as well as the contents of the questionnaire, were properly explained to each respondent before interviews, to get their consent.

The project was intended to gather information on plant and animal poisons, poisoning techniques, and their antidotes, in an attempt to allay the fears of those who believed that poisoning can only stem from witchcraft, and thereby curb the high rate of rural exodus.

The questionnaire included questions on awareness of poisons, their adverse effects on vital organs of the body, as well as their antidotes. After giving proper clarifications and obtaining their consent, the anonymous questionnaire was distributed to respondents, who completed them; they were collected the same day.

In order not to compromise spontaneity, and in order to prevent bias in the answers, the researcher did not participate in completing the questionnaire with the respondents. The results were treated and analysed using Word 97 and MS Excel programs.

The plants listed as producing poisons and those producing antidotes were collected, pressed and dried, and identified by the author. All identifications were confirmed by the staff of Cameroon National Herbarium (HNC), of the Cameroon Ministry of Scientific and Technical Research.

Dried skin specimens of animals (humans excluded) also collected were identified and the identification confirmed by Dr. J.L. Tamesse of the Laboratory of Zoology, University of Yaoundé I.

Data collected were compared with data from Cameroon ethnobotany as well as from other African countries, and analysed following scientific literature (Kerharo and Adam, 1974; Oliver-Bever, 1982). Quantitative analysis was performed using the method outlined by Bruni et al. (1997). This involved the determination of the means of a particular plant or animal for a particular poison or antidote (expressed as number of citations for specific use over the total number of respondents). It also involved the number of preparations (poison or antidote) for each species listed.

Voucher herbarium specimens and pieces of animal skin specimens were deposited at the Plant Biology Laboratory of the Higher Teachers' Training College of the University of Yaoundé I, Cameroon. A full record of the completed questionnaires is also on file at the Plant Biology Laboratory of the Higher Teachers' Training College of the University of Yaoundé I.

4. Results

All the respondents were found to regularly use plant and animal preparations for medicinal purposes in traditional healing or in automedication.

The respondents in this study requested for and obtained appropriate gifts and material compensation from the author, especially as they insisted that their knowledge constituted a means of livelihood for them and they cannot give it out for free. After several discussions, negotiations and understandings between the author and respondents on the purpose of the research, it was agreed by the latter that the results should be published as scientific information and not as ethnic issues. Through this consent, it was agreed that publication on the findings of this work would help in increasing awareness about poisoning and, hence, in reducing the rate of human poisoning among the inhabitants of this region, as well as elsewhere in Cameroon.

Only plants for which the information on the type of poison, antidote, method of preparation and administration were similar, and were obtained from respondents in at least three villages, were retained and used in data analysis in this research. The collected plants were identified using the literature references of Letouzey (1963), Aubreville (1970), Leeuwenberg (1972), Thirakul (1983), Vivien and Faure (1985) and Biholong (1986).

Thirty-eight plant species belonging to 17 families were identified and placed into two tables: Table 1, with 22 species, comprises plant poisons, and Table 2, with 16 species, comprises plant antidotes. The species in the tables are listed in alphabetical order by the scientific name.

In both tables, for each species listed, the following data are given. For single use: Latin binomial with family name, voucher specimen number, number of citations by respondents, total percentage of listing, local name and the locality (in parentheses), the plant part used and the traditional method of preparation/administration, and the induced effects (fifth column). Some plant families produce poisons on the one hand, and antidotes on the other hand: Apocynaceae, Ceasalpiniaceae, Euphorbiaceae, Fabaceae and Solanaceae.

The animal species used for analysis were those for which the listings came from at least three respondents in three localities. They were identified based on characteristics of the skin specimens and through comparison with the work of Grassé (1969a,b), Brosset (1969) and Guibe (1970). Seven animal species belonging to five families were described and regrouped into two tables: Table 3, with six animal species producing animal poisons, and Table 4, with one animal species producing animal antidotes. Tables 3 and 4 are organised in the same manner as Tables 1 and 2. All animal species whose products or body parts are used in preparing poisons or antidotes in this research can all be placed into three classes of terrestrial vertebrates, namely, Mammals (*Acinonyx jubatus*, *Felis domesticum*, *Panthera pardus*), Reptilia (*Bitis gabonica*, *Python regius*) and Amphibia (*Rana goliath*).

Table 5 gives a qualitative and quantitative summary of Tables 1–4. The wide knowledge of poisons and antidotes of plant and animal origins is illustrated by the high average listing: 2.55 per respondent for poisons and 1.32 per respondent for antidotes (Table 5). It is noteworthy that each plant or animal species is used in more than one poison preparation. These results show a substantial application of poisonous substances of plant and animal origins as indicated by the mean preparation (1.44) per species (Table 5).

The wide knowledge of poisons in these communities is shown by the fact that each respondent listed more than just a single use per plant (i.e. a proportion of 35 preparations for 22 plants species listed), giving a mean preparation of 1.59 per plant. For animals, the listing consisted of eight preparations for six animals, giving a mean preparation of 1.33 per animal. Similarly, for antidotes, 18 preparations were listed for 16 plants species, for a mean preparation per species of 1.12, and 4 preparations for a single animal species, for a mean preparation of 4 per animal species.

5. Discussion and conclusions

Most of the plant and animal species listed by respondents were authoritatively claimed to be highly potent poisons for fishing or tipping arrow heads for hunting. These have been apparently used by the people since time immemorial. These include *Bitis gabonica* and *Rana goliath* for animal species

Table 1
Plant poisons

Species (voucher specimen number) and [citation]	Local name (locality)	Plant part used and method of administration	Induced effects reported
Albizia zygia (DC) J.F. Macbr. (Mimosaceae) (Noumi 1008) [3; 0.52][a]	ANGO OYOME (Mbalmayo), ESSAK (Ebolowa)	Maceration prepared from leaves and introduced into the food or the drink	General intoxication
Datura metel L. (Solanaceae) (Noumi 1024) [6; 1.05]	NOM TAH (Mbalmayo)	Leaf juice in the food	Hallucinatory delirium, visions and hypnotic properties:
Datura stramonium L. (Solanaceae) (Noumi 1026) [3; 0.52]	SIPA (Eséka)	- Leaf extract in the food	- Euphoria
		- Seed powder in the food	- State of apathy - Coma
Dichapetalum rudatisii Engl. (Dichapetalaceae) (Noumi 1009) [19; 3.35]	MVE NDIGI (Mbalmayo)	Seeds ground into a paste and added to meal as a lure to kill mice in the house	General intoxication
Dioscorea dumetorum Pax (Dioscoreaceae) (Noumi 1045) [4; 0.71]	BANG (Mbalmayo)	Tuber powdered and introduced into the food or the soup	Convulsing action
Euphorbia kamerunica Pax (Euphorbiaceae) (Noumi 1007) [31; 5.46]	ZEG MVELE (Mbalmayo)	Tree's latex. Cake of *Cucumeropsis edulis* (Hook. F.) Cogn. (Cucurbitaceae), added with tree's latex	Drastic purgative
Erytrophleum suaveolens G. Don. (Caesalpinaceae) (Noumi 1011) [10; 1.76]	TOM (Eséka), ELON (Mbalmayo)	- Stembark or seed juice as arrow poison	General intoxication
		- Stembark or seed powder in the food is used as a lure to kill animals	Rat poison
		- Decoction of 200 g of stembark in 1 L of water is used as an ordeal poison	Heart failure and swollen stomach
Fagara macrophylla Engl. (Rutaceae) (Noumi 1014) [5; 0.88]	LONGUE (Eséka,), BONGO (Mbalmayo)	- Stembark juice on the arrow head as arrow poison	General intoxication
		- Maceration of crushed stembark introduced into a river course as fish poison	
Jatropha curcas L. (Euphorbiaceae) (Noumi 1047) [27; 4.76]	LADA MINSONO (Mbalmayo)	Latex, seeds or leaf powder introduced into the food	Drastic purgative. Six or seven seeds eaten in the meal can kill
Milletia barteri (Benth.) Dun. (Fabaceae) (Noumi 1010) [8; 1.41]	NDIG ATUI (Mbalmayo), ATIIE NDZIC (Ambam)	Stem, leaves	Paralysis of dorsal fin of fishes
		- 20 or 30 kg of crushed stem macerated and introduced in a water course	
		- Leaf powder in stored food	Insecticide effect
		- Bathing of hair with a decoction prepared from leaves to kill lice	
Nerium oleander L. (Apocynacae) (Noumi 1039) [4; 0.71]	NGOM NTANGAN (Mbalmayo)	Leaf powder in food	Powerful intensification of palpitation, modulation of rhythm and slowing down of pulse rate
Nicotiana tabacum L. (Solanaceae) (Noumi 1036) [15; 2.64]	TAH (Mbalmayo), DEPAH (Bandjoun), NDIFONG (Ombessa)	- Leaf juice as arrow poison	Excitement and paralysing action
		- Leaf juice orally or as an enema	
Pachyelasma tessmannii (Harms) Harms (Caesalpinaceae) (Noumi 1011) [13; 2.29]	EYEK (Mbalmayo)	Fruits	Fishes die due to ichtyotoxic effect
		crushed and macerated fruits emptied in a blocking course of river	

Table 1 (*Continued*)

Species (voucher specimen number) and [citation]	Local name (locality)	Plant part used and method of administration	Induced effects reported
Ricinus communis L. (Euphorbiaceae) (Noumi 1017) [4; 0.71]	NOM MBON (Mbalmayo)	Seed powder in food	Nausea, vomiting, profuse bleeding, diarrhoea, sweat and cyanosis
Strophantus gratus (Hook.) Franch. (Apocynacae) (Noumi 1016) [14; 2.46]	ENE (Mbalmayo), ENI (Ambam)	Crushed seeds in paste rubbed on the arrow head as arrow poison	Cardiac poison, hypertension, vomiting, muscular weakness
Strophantus hispidus DC. (Apocynacae) (Noumi 1021) [22; 3.88]	EIVE (Mbalmayo), ENE MINVOT (Yaoundé)	Seed, root bark. Powder of root bark or seeds in the food	Cardiac poison, hypertension, vomiting, muscular weakness
Strychnos aculeata Solereder (Loganiaceae) (Noumi 1028) [10; 1.76]	ASÔL (Eséka), AWÔ (Ambam), MENGENGES ELE (Mbalmayo)	- 30 seeds in a paste and rubbed on an arrow head as arrow poison - The seed paste introduced in a river course as fish poison	Convulsive action and the phenomenon of tetanus. Fishes die due to toxic effect
Strychnos elaeocarpa Leeuw. (Loganiaceae) (Noumi 1037) [5; 0.88]	ASÔL (Eséka), MENGENGES ELE KRIBI (Mbalmayo)	See *Strychnos aculeata*	See *Strychnos aculeata*
Strychnos staudtii Gilg. (Loganiaceae) (Noumi 1013) [4; 0.71]	MENGENGES ELE MUNGO (Mbalmayo)	See *Strychnos aculeata*	See *Strychnos aculeata*
Strychnos ternata Leeuw. (Loganiaceae) (Noumi 1012) [4; 0.71]	MENGENGES ELE BERTOUA (Mbalmayo)	See *Strychnos aculeata*	See *Strychnos aculeata*
Tephrosia vogelii Hook. F. (Fabaceae) (Noumi 1043) [49; 8.64]	OFE (Mbalmayo)	- Maceration of crushed leaves, fruits and seeds, emptied in a blocking course of river - Powder of the leaves used to preserve food against harmful insect - Leaf decoction used against lice	- Fishes die due to ichtyotoxic effect - Insecticide effect
Thevetia neriifolia Juss. (Apocynacae) (Noumi 1033) [12; 2.11].	NGUNDUNG (Mbalmayo)	20 seeds crushed into paste and rubbed on the arrow head as arrow poison	Emetic action with hypnotic and anaesthetising properties

[a] The voucher specimen number of the author is in parentheses. Numbers in brackets indicate total citation for species and percent of citation (listing).

(Table 3), and *Dioscorea dumetorum*, *Erytrophleum suaveolens*, *Jatropha curcas*, *Nicotiana tabacum*, *Strophantus gratus*, *Strophantus hispidus*, *Strychnos aculeata* and *Strychnos elaeocarpa* (Table 1) for plant species.

Some of the species reported, such as human, *Homo sapiens* (Table 4), *Acinonyx jubatu* and *Panthera pardus* amongst animals (Table 3), *Dichapetalum rudatisii*, *Fagara macrophylla*, *Milletia barteri* (Table 1) and *Tetrorchidium didymostemon* (Table 2) amongst plant species, have never been reported in the Cameroon ethnopharmacological literature (Cousteix, 1961; Esso et al., 1987; Chenu and Ake Assi, 1992; Chenu et al., 1992; Kingue Kwa et al., 1994; Adjanahoun et al., 1996; Noumi et al., 1998, 1999; Noumi and Dibakto, 2000; Noumi and Tchakonang, 2001). For others, new therapeutic uses are here reported: secretions of *Homo sapiens* (Table 4), *Arachis hypogaea* and *Vitex grandifolia* (Table 2).

The data show that some poisonous species like *Euphorbia kamerunica*, *Milletia barteri*, *Strychnos ternata* (Table 1) and *Rana goliath* (Table 3), occur either strictly locally or are not frequently reported in the other parts of Cameroon. In the country, the peculiarities of poisons may be attributed to cultural stratification resulting from several waves of colonisation. The examples that may be mentioned here is the introduction of exotic toxic ornamental plants, such as *Thevetia neriifolia* and *Nerium oleander* (Apocynaceae), and some plant species not recorded in this study, such as *Caladium bicolor* (Ait.) Vent. (Araceae), *Breynia nivosa* (W.G.Sm.) Small, and *Euphorbia pulcherrima* Willd. ex Klotzsch (Euphorbiaceae), by explorers and colonial masters, which reinforce the probability of daily accidental poisoning in children.

It may be worth noting that in the Mbalmayo and Eseka regions, some intoxications are known to result from mixing certain meals, such as:

- tapioca (or gari) from *Manihot esculenta* Crantz (Euphorbiaceae) [Noumi 988] eaten with the fruit of *Spondias mombin* L. (Anacardiaceae) [Noumi 1417] leads to a deadly colic effect;
- mixing foods derived from *Vigna unguiculata* (L.) Walp. (Fabaceae) [Noumi 1420] and from *Phaseolus vulgaris* L. (Fabaceae) [Noumi 1406] creates a drastic diarrhoea;

Table 2
Plant antidotes

Species (voucher specimen number) and [citation]	Local name (locality)	Plant part used and method of administration	Induced effects reported
Ageratum conyzoides L. (Asteraceae) (Noumi 993) [14; 2.46][a]	NTOTOO (Eséka), NYADA ELOG (Mbalmayo), GHÈ GUEFA (Bandjoun)	A maceration prepared from 1 handful of non flowering leafy plant in 1 L of water, then, 1 glassful six times a day	Emetic effect
Alstonia boonei De Wild. (Apocynaceae) (Noumi 1034) [8; 1.41]	KOKOMATI (Eséka), EKUK (Mbalmayo)	The latex of the plant is drunk for relief if somebody is poisoned by *Strophantus* spp.	Anti-poison against *Strophantus gratus* or *Strophantus hispidus*
Annona muricata L. (Annonaceae) (Noumi 1041) [6; 1.05]	SABA-SABA (Eséka), EBOM BETI (Mbalmayo)	A decoction prepared from 1 handful of root in 2.5 L of water is drunk, 1 cupful thrice a day until health establishment	Anti-poison
Arachis hypogaea L. (Fabaceae) (Noumi 1023) [8; 1.41]	OWONDI (Eséka), OWONDO (Mbalmayo), OSOBA (Ombesa)	Wounded area by poisoning arrow, covered by seed paste	The poison introduced by arrow is absorbed by the seed paste of *Arachis hypogaea*
Bidens pilosa L. (Asteraceae) (Noumi 1031) [9; 1.58]	HASEGE (Eséka), OKPADI (Mbalmayo)	Fresh leaf juice applied on the snake bite	General antidote and antidote of snake bite:
Crinum purpurascens Herb. (Amaryllidaceae) (Noumi 1008) [11; 1.94]	YLANG MATIB-LA (Eséka,), AYANG NSU (Mbalmayo)	- Leaves eaten or solution of crushed leaves macerated in the water and the maceration drunk	- General anti-poison
		- Paste of 1 leaf and 1 handful of leaves of *Cleome rutidosperma* DC. (Cleomaceae) into 250 mL of kernel oil, then, 1 teaspoonful 3 times a day for 1 week	- Antidote of mystical poisoning
Desmodium adscendens (Sw.) DC.(Fabaceae) (Noumi 774) [8; 1.41]	OWONDO BEKON (Mbalmayo)	Leaf juice on the enlarged snake bite	General antidote against snake bite
Gardenia ternifolia Schum. and Thonn. (Rubiaceae) (Noumi 1049) [7; 1.23]	IHEUNG (Eséka)	Leaves chewed in case of poisoning	General anti-poison
Guibourtia tessmannii (Harms). J. Léonard, (Caesalpiniaceae) (Noumi 1015) [18; 3.17]	SIMINGAN (Eséka), ESINGAN (Mbalmayo)	A decoction prepared from a handful of stembark in 2 L of water, used as an enema to stop the purgative effect of *Euphorbia kamerunica* sap	Antidote against *Euphorbia kamerunica* sap
Landolphia sp. (Apocynaceae) (Noumi 1044) [7; 1.23]	AVOM (Mbalmayo)	A hunter wounded by an arrow poisoned with *Strophantus* spp. Cheeses the wound with the sap of *Landolphia* alone or mixed with *Alstonia boonei* sap	Antidote against *Strophantus* spp.
Palisota barteri Hook. F. (Commelinaceae) (Noumi 1037) [6; 1.05][a]	EKOOK (Mbalmayo)	1 dried stem, powdered with 1/3 fruit of *Aframomum melegueta* (Ndong in Mbalmayo) and the powder applied on the scarifications around the snake bite	General antidote against snake bite:
Rauvolfia vomitoria Afz. (Apocynaceae) (Noumi 1048) [15; 2.64]	MENDZANGA-MENDZANGA (Mbalmayo), OBÈÈTOAN MVE (Eséka)	- Poisoning: ground root bark swallowed	- Anti-poison effect
		- Snake, scorpion or spider bite: root bark paste spreading on the wound and a small root bark juice swallowed	- Antidote against some animal bites
Solanum torvum Sw. (Solanaceae) (Noumi 1050) [5; 0.88]	NANGA (Eséka), AZON KOMBE (Mbalmayo), ZON KOMBA (Ombesa)	Leaves chewed as anti-poison	Anti-haemorrhagic properties
Tetrorchidium didymostesmon (Baill.) Pax (Euphorbiaceae) (Noumi 1018) [11; 1.94]	EFOBOLO (Mbalmayo)	1 handful of stembark macerated in 2 L of water, and two glassfuls swallowed to vomit the maceration of *Erythrophleum suaveolens*	Antidote against *Erythrophleum suaveolens* decoction in ordeal by poison. The decoction is emetic

Table 2 (*Continued*)

Species (voucher specimen number) and [citation]	Local name (locality)	Plant part used and method of administration	Induced effects reported
Trichilia emetica Vahl (Meliaceae) (Noumi 1033) [5; 0.88]	MENDZANGA (Mbalmayo)	1 handful of crushed root is boiled in 2 L of water for 15 min, then, 1 glassful three times a day for 4 days	General anti-poison with emetic action
Vitex grandifolia Gürke (Verbenaceae) (Noumi 1035) [3; 0.52]	MVOULE (Eséka), EVULA (Ebolowa)	The decoction of 1 handful of leaves in 2 L of water, added with crushed seeds of *Aframomum melegueta* Roscoe (Zingiberaceae); 1 glassful thrice a day	Anti-poison in case of mild poisoning

[a] The voucher specimen number of the author is in parentheses. Numbers in brackets indicate total citation for species and percent of citation (listing).

- *Cola acuminata* (P. Beauv) Schott et Endl. (Sterculiaceae) [Noumi 1323] eaten with the juice of *Citrus aurantifolia* (Christm.) Swingle (Rutaceae) [Noumi 998], leads to a serious stomach burn;
- roasted grains of *Zea mays* L. (Poaceae) [Noumi 1412] eaten with *Solanum incanum* L. (Solanaceae) [Noumi 1380], creates a chronic constipation; in this case, it was reported that the victim becomes very weak to the point of dying.

People who are not aware of these causes would think that, in such cases, the victim is poisoned by someone.

The uses of *Datura metel*, *Erytrophleum suaveolens*, *Fagara macrophylla*, *Nicotiana tabacum*, *Strychnos aculeata*, *Strophantus hispidus* and *Tephrosia vogelii* (Table 1) by these peoples are similar to the uses made by other African people (Dalziel, 1937; Paris and Rigal, 1940; Rigal, 1941; Oliver-Bever, 1960; Bouquet, 1969; Pelt, 1969; Firsh and Waterman, 1971; Kerharo and Adam, 1974), thus lending support to their uses in poisoning practices. Similarly, the use of *Ageratum conyzoïdes*, *Gardenia ternifolia*, *Guibourtia tessmannii* and *Rauvolfia vomitoria* (Table 2) as antidotes by these communities is identifiable to that described by Kerharo and Adam (1974), Pousset (1992) and Bouquet (1969), for other African people as well.

The toxicity of some of the plants reported in this work (Table 1) are confirmed by scientific data. For example, *Datura metel* yields hoscyamine and two parasympathicolytics, such as atropine (Fattorusso and Ritter, 1967), which act by accelerating the heart beat. The seeds of *Dichapetalum rudatisii* yields monofluro-acetic acid, which is a very toxic substance, and *Dioscorea dumetorum* contains in the tubers dioscorine and dihydrodioscorine (Bevan and Hirst, 1958) with convulsing actions (Broadbent and Schnieden, 1958). *Nicotiana tabacum* contains nicotine which kills cold-blooded animals (insects, frogs) and some warm-blooded animals (dogs, cats, pigs and even human beings) (Planchon and Bretin, 1946). Poisoning due to nicotine is explained by its double action to excite and to paralyze. One to two drops of leaf juice on the tongue or the eye of a dog kills it. *Ricinus communis* contains ricine which agglutinates red blood corpuscles of vertebrates and like all other antigens, stimulates the production of antibodies with specific immunising effects. Death follows in 8

Table 3
Animal poisons[a]

Species (voucher specimen number) and [citation]	Local name (locality)	Animal part used and traditional method of administration	Induced effects reported
Acinonyx jubatus L. (Felidae) (Noumi 1304) [15; 2.64][b]	NGOYONG (Ombessa), BELE (Yagoua), NGWE (Bangem), NOM ZE (Mbalmayo)	Just a tiny fragment of whisker into the food or the soup	Broncho-pneumonia syndromes: - Thick and dried cough - Heavily resounding and explosive type - Mimicking tuberculosis, leading to a painful death
Bitis gabonica Gray (Viperinae) (Noumi 1306) [10; 1.76] or *Bitis* spp.	PÉE (Eséka), YEE (Yagoua), PÈNE (Mbalmayo), EULIB (Bangen)	The collected venom is absorbed by a dried peeled fruit of *Musa* sp. (Musaceae). The powder of that fruit in a finger nail is easily sprinkled on the food	- The poisoned person sweats profusely - Sudden feeling of dizziness - Heart and pulmonary failure

Table 3 (*Continued*)

Species (voucher specimen number) and [citation]	Local name (locality)	Animal part used and traditional method of administration	Induced effects reported
Felis domesticum L. (Felidae) (Noumi 1303) [20; 3.52]	SING (Eséka), ESSINGA (Mbalmayo), TIMINI (Yagoua), IGSINÉ (Ombessa), BÈLÈ (Bangem), POUSSI (Bandjoun)	A tiny fragment of whisker into the food or the soup	Respiratory asthmatic syndromes: - Strong cough, difficult breathing - The breathing spasm often leading to the expectoration of thick and purulent phlegm - Painful death
Panthera pardus L. (Felidae) (Noumi 1302) [23; 4.05]	NJIE (Eséka), ZE (Mbalmayo), NOM GWUI (Bandjoun)	A tiny fragment of whisker in the food, preferably hidden in a dish of *Solanum nigrum* leaves	Pneumonia respiratory syndromes: - Hard and painful cough - A coloured phlegm rust-like - Painful death
Python regius Daudin (Pythonidae) (Noumi 1307) [15; 2.64]	MBOM (Eséka), NKUMÉ (Ombessa), WETCHOUE (Yagoua), NGEM (Mamfe), GAM NOCK (Bandjoun)	Gall collected from a gall-bladder of the animal	- Necrosis of internal tissues
		- Gall absorbed by a peeled *Musa* sp. (Musaceae) fruit, dried by roasting into hot ashes. That fruit powder is introduced in foods or drinks - Few drops of gall in food or drink	
Rana goliath Boulanger (Pythonidae) (Noumi 1305) [18; 3.17]	LIBEM (Eséka), ABEM (Mbamalyo), NGOLONGJO (Ombessa)	Venom from mucus glands of the animal skin back	- Stomach pain with diarrhoea and vomiting
		- Fragment of the back skin rich in mucus gland introduced in soap - Venom collected by maceration in small quantity of water and introduced into the food or the soup	

[a] All animal poisons are dropped into the food, the soup or the drink of a victim. Poisoning by a small piece of *Rana goliath* skin foams abundantly, due to mucus, after 4 h.

[b] The voucher specimen number of the author is in parentheses. Numbers in brackets indicate total citation for species and percent of citation (listing).

Table 4
Animal antidotes

Species and [citation]	Local name (locality)	Animal substances used and traditional method of administration	Induced effects reported
Homo sapiens L. (Hominidae) [53; 9.34][a]	MUT (Eséka), MOT (Mbalmayo) MOM NONG (Bandjoun)	- Breast milk applied on the bee bite area	- Antidote for insect bite
		- Ear wax put on the wound made by poisoned arrow with *Strophantus gratus* or *Strophantus hispidus*	- Antidote for *Strophantus* spp.
		- Urine: 1 glassful of urine drunk immediately after poisoning and early in the morning for at least 3 days	- Antidote for oral poison
		- Vagina secretion smeared on spot bitten by insect or snake; immediate drinking urine will fasten the process	- Antidote for oral poison or snake or bee bite

[a] Numbers in brackets indicate total citation for species and percent of citation (listing).

Table 5
Statistics of respondents (146 respondents)[a]

Total number of citations[b]				Average of citation per respondent[c]				Species recorded				Total number of preparations[d]				Average preparations per species[e]			
Poison		Antidote		Poison		Antidote		Poison		Antidote		Poison		Antidote		Poison		Antidote	
Plant	Animal	Plant	Animal	Plant	Animal	Plant	Animal	Plant	Animal	Plant	Animal	Plant	Animal	Plant	Animal	Plant	Animal	Plant	Animal
272	101	141	53	1.86	0.69	0.96	0.32	22	6	16	1	35	8	18	4	1.59	1.33	1.12	4
373		194		2.55		1.32		28		17		43		22		2.92		5.12	

[a] 79 from Nyong-et-Kellé, 67 from Nyong-et-So.
[b] Citation: number of respondents who cited the species.
[c] Number of citations for specific use over total number of respondents (e.g. plant poison: 272/146 = 1.86).
[d] Number of recipes in which the species are used (data extrapolated from Tables 1–4; columns 3).
[e] Number of preparations over total number of species for specific use (e.g. plant poison: 35/22 = 1.59; animal antidote: 4/1 = 4).

days and post-mortem examination reveals the necrosis of most vital organs (Watt and Breyer-Brandwijk, 1962).

Some plant products (Table 1) act on the cardiovascular system. *Erytrophleum suaveolens* contains erythrophleine (Paris and Rigal, 1941) which has a digitalis-like effect of raising blood pressure, slowing pulse rate and increasing the force of the heart beat, as well as decreasing breathing rate, with breathing difficulties, vomiting and convulsions (de V. Cotten et al., 1952). *Nerium oleander* contains oleandrin (Dykman et al., 1966) with a powerful intensifying effect on palpitation. Oleandrin is a tonicardiac heteroside (Pelt, 1969). *Strophantus hispidus* contains 48% of amorphous strophantoside H, a cardiotonic principle (Euw and Reinchstein, 1950; Keller and Tamm, 1950) as well as peruvoside, neriifolin and theretin of *Thevetia neriifolia* (Frèrejacque and Waterman, 1947; Datta and Datta, 1977). The seeds of *Strophantus gratus* contain ouabain (Paris and Moyse, 1971) which causes hypertension, tachycardia and finally heart failure. *Strychnos aculeata* yields strychnine, a curare which is exceedingly toxic, with convulsive action due to general excitability of nerves, leading to the onset of tetanus (Pelt, 1969).

Experimental literature data also provide scientific support for the use of plant species as anti-poisons. For example, *Arachis hypogaea* (Table 2) has a hemostatic factor, first reported by Boudreaux and Frampton (1960), which considerably improves the condition of patients with hemolysis by causing vasoconstriction of the blood vessels, as a beneficial action against arrow poison. *Rauvolfia vomitoria* acts by the diarrhoeic action of reserpine (Fattorusso and Ritter, 1967) and *Ageratum conyzoides* (Table 2) by emetic effects of its essential oil (Kuate, 1993).

The route of administering for some plant products (Table 1) may render them poisonous or useful. For example, the maceration of the stembark of *Erytrophleum suaveolens* is a poison if taken orally, but when administered topically, it treats filariasis and oedema. An infusion of the same stembark is used to heal ulcerated hands and legs in leprotic patients. Seed oil extracted from *Jatropha curcas*, which is an oral poison, is used topically to remedy dropsy, sciatica, paralysis and skin diseases. The prescription is made by tradipractitioners who regulate the dosage and, hence, its degree of toxicity. The leaf juice of *Strophantus gratus* is an arrow poison, but the leaf decoction taken orally treats gonorrhea. The fruit paste of *Strophantus hispidus* and *Solanum torvum* is mixed with palm oil and indigenous salt, and swallowed to cure cirrhosis and cardiac infections; leaf maceration of *Nicotiana tabacum*, in the vaginal bath, is considered aphrodisiac (Noumi et al., 1998).

The techniques of poisoning are subtle. For example, a dried banana fruit is saturated with a liquid poison. Its powder, placed in long finger nails, is deposited in the food or the drink of the victim upon passing the hand over the dish or the glass. Most often, one hand presents a kola (seeds of C*ola acuminata*, Sterculiaceae) to the audience, while the other deposites a poison for a designated victim. For smokers, the

enemy, after asking for the victim's lighted cigarette, to light his own, puts the deadly poison on the filtered bout, before handing it back to the owner.

The result of these is a world in which criminal or accidental poisoning remains a permanent threat. This explains why there is particularly active research into anti-poisons. The author found in tradipractitioners' arsenal: purgatives, tannins and emetic concoctions. Prevention being the best remedy. Suspicion or distrust remains very preoccupying in the region.

Examples:

- A few drops of the gall of *Python regius* (Table 3) in a well could have widespread devastating deadly effects on a whole village, especially on those who drink that well water. As a result, any *Python regius* killed must be slaughtered in the presence of other members of the immediate community (chief and other villagers, law officers) who jointly witness the proper and the safe disposal of the gall-bladder contents when removed, to ensure that no one has access to using it for whatever purpose. If found in possession of the gall of *Python regius*, a person faces legal proceedings with imprisonment and banishment from the village.
- Any person who brings food or palm wine for public consumption must taste it before serving it to the others.
- In the traditional setting, most people only drink with the same cup, passing it from one person to the other. The server or bearer of the wine must taste it publicly in the same cup before serving it to people.
- In public drinking places, most people avoid drinking from glasses and prefer to drink directly from the bottle, which is regularly covered with the hand.
- Others always have their own cup for drinking wine.

As a conclusion it can be said that, scientific research always seeks to establish the link between the traditional use of plant in ethnomedicine and its use in modern medicine. For example, two violent toxins (strophantidine and ouabain from *Strophantus gratus*) are today useful treatments for certain cardiac problems (Le Ganier Delamare, 1974). In this region as anywhere else, keen observations coupled with an analytical mind led the Ewondos and Bassas to discover the many poisonous plant and animal products reported in this work. They have produced poisons from plants and animals, since time immemorial, which they use for tribal wars, hunting, fishing as well as doing justice by ordeal or to execute people condemned to death.

Today poisons are used by those who reject debate, positive thinking and reason, thus preferring to let vice precede over virtue in deciding a solution to a problem. One can understand that in a world where premeditated or accidental poisoning are perpetual threats, research into specific or broad spectrum anti-poisons can be very pre-occupying. Thus, the Machiavellian behaviour of those who resort to such unorthodox means of settling problems or achieving their evil intentions must be condemned unreservedly.

Acknowledgements

Thanks are due to all the persons who participated in this survey by providing information, and especially, to Philippe Biheng, a traditional healer of Makak village, for his cooperation in the field work.

References

Adjanahoun, J.E., Aboubakar, N., Dramane, K., Ebot, M.E., Ekpere, A., Enow-Orock, E.G., Focho, D., Gbile, Z.O., Kamanyi, A., Kamsu Kom, J., Keita, A., Mbenkum, T., Mbi, C.N., Mbiele, A.L., Mbome, I.L., Mubiru, N.K., Nancy, W.L., Nkongmeneck, B., Satabie, B., Sofowora, A., Tamze, V., Wirmum, C.K., 1996. Traditional Medicine and Pharmacopoeia: Contribution to Ethnobotanical and Floristic Studies in Cameroon. Scientific Technical and Research Commission, Organisation of African Unity, p. 641.

Aubreville, A., 1970. Légumineuses-Césalpinioïdées. Flore du Cameroun, vol. 9. Yaoundé, p. 339.

Bevan, C.W.L., Hirst, J., 1958. A convulsant alkaloid of *Dioscorea dumetorum*. In: Chemistry and Industry. London, p. 103.

Biholong, M., 1986. Contribution à l'étude de la Flore du Cameroun: les Astéracées. Thèse Doctorat d'Université, Université de Bordeaux, p. 365.

Boudreaux, H.B., Frampton, V.L., 1960. A peanut factor for haemostasis in haemophilia. Nature (London) 185, 469–470.

Bouquet, A., 1969. Féticheurs et Médecines Traditionnelles du Congo Brazzaville. Mémoires ORSTOM. Paris, p. 282.

Brosset, A., 1969. Mœurs, rapport avec le milieu, classification des Mamifères. In: Grassé, P.-P. (Ed.), La Vie des Animaux, tome 3: La Montée vers L'homme. Librairie Larousse, Paris, pp. 277–381.

Bruni, A., Ballero, M., Poli, F., 1997. Quantitative ethnopharmacological study of the Campidano Valley and Urzulei District, Sardinia, Italy. Journal of Ethnopharmacology 57, 97–124.

Cameroun/FNUAP, 1987. Demo 87. Edition SOPECAM. Yaoundé, p. 30.

Chenu, J., Ake Assi, L., 1992. Plantes Médicinales Tropicales et Camerounaises, tome 1. Edition Ren-Ronche Berrebi Veronique. Barcelona, p. 222.

Chenu, J., Oury, R., Lavegne, R., Seguele, J., 1992. Plantes Médicinales Tropicales et Camerounaises, tome 2. Edition Haricot. Moubain, p. 134.

de. V. Cotten, M., Goldberg, L.J., Walton, R.P., 1952. Cassaine and cassaidine: quantitative measurements of heart contractile force in situ. Journal of Pharmacology and Experimental Therapeutics 106, 94–102.

Cousteix, P.J., 1961. L'Art et la Pharmacopée des Guérisseurs Ewondo (Région de Yaoundé). Recherches et Etudes Camerounaises, Yaoundé, p. 87.

Dalziel, J.M., 1937. The Useful Plants of West Tropical Africa. Crown Agents, London.

Datta, S.K., Datta, P., 1977. Pharmacology of *Thevetia peruviana* bark. Quarterly Journal of Crude Drug Research 15, 199–224.

Dykman, M.J., Boss, M., Lichter, W., Sigel, M.M., O'Connor, J.E., Search, R., 1966. Cytotoxic substances from tropical plants. Cancer Research 26, 1121–1130.

Esso, J., Lobe, G., Nkongo Otto, B., de Rosny, E., 1987. Pharmacopée Traditionnelle Douala, tome 1. Les Cahiers du Male Ma Makom, Douala, p. 223.

Euw, J.V., Reinchstein, T., 1950. Cardenosidide von *Strophantus hispidus*. Helvetica Chimica Acta 33, 1546–1550.

Fattorusso, V., Ritter, O., 1967. Dictionnaire de Pharmacologie Clinique. Masson éditeur. Paris, p. 89.

Firsh, F., Waterman, P.G., 1971. Alkaloids from two Nigerian species of *Fagara*. Journal of Pharmacy and Pharmacology 23, 1235–1253.

Frèrejacque, M., Waterman, M., 1947. Thevetine, nerilifoline et monsoutyl-nerifoline. Compte Rendus de l'Académie des Sciences 225, 695–706.

Grassé, P.-P., 1969a. La Vie des Amphibiens. In: Grassé, P.-P. (Ed.), La Vie des Animaux, tome 3: La Montée vers L'homme. Librairie Larousse, Paris, pp. 106–138.

Grassé, P.-P., 1969b. La Vie des Reptiles. In: Grassé, P.-P. (Ed.), La Vie des Animaux, tome 3: La Montée vers L'homme. Librairie Larousse, Paris, pp. 140–189.

Guibe, J., 1970. La Systématique des Reptiles actuels. In. Grassé, P.-P. (Ed.), Traité de Zoologie, tome 14, fascicule 3. Masson éditeurs. Paris, pp. 1054–1160.

Keller, L., Tamm, C., 1950. Die glykoside der Samen von *Strophantus hispidus* DC. Helvetica Chimica Acta 42, 2458–2467.

Kerharo, J., Adam, J.G., 1974. La Pharmacopée Sénégalaise Traditionnelle, Plantes Médicinales et Toxiques. Édition Vigot-Frères. Paris, p. 1011.

Kingue Kwa, N., Nkongo Otto, B., Tongo Etonde, S., Moussongo, A., Ouea Ndangue, A., de Rosny, E., 1994. Pharmacopée Traditionnelle Douala, tome 2. Les Cahiers du Male Ma Makom, Douala, p. 205.

Kuate, J.R., 1993. Détermination des teneurs des propriétés chimiques et des activités anti-microbiennes des huiles essentielles de quelques Astéracées en médecine traditionnelle au Cameroun. Thèse Doctorat 3ième Cycle, Université de Yaoundé.

Le Garnier Delamare, 1995. Dictionnaire des Termes de Médecine. Edition Maloine. Evreux, p. 1095.

Leeuwenberg, A.J.M., 1972. Loganiacées. Flore du Cameroun, vol. 12. Yaoundé, p. 153.

Letouzey, R., 1963. Rutacées, Zygophyllacées, Balanitacées. Flore du Cameroun 1. Yaoundé, p. 173.

Noumi, E., Amvan Zollo, P.H., Lontsi, D., 1998. Aphrodisiac plants used in Cameroon. Fitoterapia 69, 125–134.

Noumi, E., Houngue, F., Lontsi, D., 1999. Traditional medicines in primary health care: plants used for the treatment of hypertension in Bafia, Cameroon. Fitoterapia 70, 134–139.

Noumi, E., Dibakto, W.T., 2000. Medicinal plants used for peptic ulcer in the Bangangte region, western Cameroon. Fitoterapia 71, 406–412.

Noumi, E., Yomi, A., 2001. Medicinal plants used for intestinal diseases in Mbalmayo Region, Central Province, Cameroon. Fitoterapia 72, 246–254.

Oliver-Bever, B., 1960. Medicinal Plants in Nigeria. Nigerian College of Arts, Science and Technology, p.138.

Oliver-Bever, B., 1982. Medicinal plants in tropical west Africa I: plants acting on the cardiovascular system. Journal of Ethnopharmacology 5, 1–71.

Paris, R., Moyse, H., 1971. Précis de Matière Médicale, vol. 3. Masson édition. Paris.

Paris, R., Rigal, M., 1940. Recherches préliminaires sur l'écorce d'*Erythrophleum guineense*. Bulletin des Sciences Pharmacologiques 47, 79–87.

Paris, R., Rigal, M., 1941. Les Recherches sur les *Erythrophleum* II, Les *Erythrophleum* de l'Afrique occidentale. Bulletin des Sciences Pharmacologiques 48, 362–372.

Pelt, J.M., 1969. Les Médicaments. Edition Seuil. Bourges, p. 192.

Planchon, L., Bretin, Ph., 1946. Précis de Matière Médicale, vol. 2. Maloine édition. Paris.

Pousset, J.L., 1992. Plantes Médicinales Africaines: Possibilités de Développement. Edition ACCT. Paris, p. 159.

Rigal, M., 1941. Recherches botaniques, chimiques et pharmacologiques sur l'*Erythrophleum* de l'Afrique occidentale. Thèse Doctorat en pharmacie, Paris.

Thirakul, S., 1983. Manuel de Dendrologie, Cameroun. Groupe Poulin Thériault, Québec, p. 640.

Vivien, J., Faure, J.J., 1985. Arbres des forêts denses d'Afrique Centrale. Edition ACCT. Paris, p. 565.

Watt, J.M., Breyer-Brandwijk, M.G., 1962. The Medicinal and Poisonous Plants of Southern and Eastern Africa. Livingstone, Edinburgh, p. 1457.