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Phytochemical analyses of aqueous extracts of two medicinal plants from Gabon: *Pseudospondias longifolia* and *Antrocaryon klaineanum*

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Abstract
Pseudospondias longifolia (Anacardiaceae) and *Antrocaryon klaineanum* (Anacardiaceae) are two plants used in the traditional medicine in Gabon. The aqueous extracts of their stem barks were phytochemically analysed. Alkaloids, saponins, tannins and reductor compounds were found in the extract of both plants. Flavonoids were only found in the extract of *Pseudospondias longifolia* whereas both extracts did not contain sterols and terpenoids.
Keywords: *Pseudospondias longifolia*, *Antrocaryon klaineanum*, phytochemical, medicinal plants.

1. Introduction

Medicinal plants are very important to the health of many African people and they are also part of their diet. The medicinal properties of these plants are known empirically (Nacoulma, 1996) but can be scientifically explained by the presence of some chemically active substances that produce a definite physiological action on the human body (Edeoga et *al*, 2005). These bioactive substances extracted from plants using various methods have allowed scientists to understand the traditional use of a wide variety of medicinal plants (Zirihi et *al*, 2005; Kamanzi, 2002; Abogo Mebale et *al*, 2013). The most important bioactive constituents of plants are alkaloids, tannins, flavonoids, and phenolic compounds (Hill, 1952). They are also sometimes added to foods meant for pregnant and nursing mothers for medicinal purposes (Jeruto et *al*, 2011).
In Gabon, the stem barks of *Pseudospondias longifolia* (Anacardiaceae) and *Antrocaryon klaineanum* (Anacardiaceae) are used in traditional medicine as analgesic, anti-malaria, anti-diarrhea, or against skin diseases, stomach ulcer and diabetes… (Raponda-Walker et *al*, 1995; Ndebia et *al*, 2007, Nkeh -Chungag et *al*, 2009). However no data on the phytochemical content of these plants has been done so far. Thus, the objective of this study is to characterize the phytochemical profile of the stem bark extracts of *Pseudospondias longifolia* and *Antrocaryon klaineanum*.

2. Materials and Methods

2.1 Plant Material
The stem barks of *Pseudospondias longifolia* and *Antrocaryon klaineanum* were collected in January 2012 in the northern Gabon (village Centreville). Authentification was done at the herbarium of the 'Institut de Pharmacopée et de Médecine Traditionelle' (IPHAMETRA) of Libreville in Gabon.
After washing, the stem barks were dried at room temperature for two weeks. The dried stem barks were then ground into a fine powder using the mechanical grinder. Thereafter, the powder was stored at 4°C until analyses.
2.2 Preparation of extracts.
Extract 1
Boiling distilled water (100 mL) was added to 15 g of the stem bark powder of each plant. After 15 min, the mixture was filtered through Whatman paper No 1. The **Extract 1** was thus obtained and stored at 4°C until analyses.
Extract 2
Distilled water (100 mL) was added to 15 g of the stem bark powder of each plant. The mixture was heated under reflux for 15 min. After cooling at room temperature, the mixture was filtered through Whatman paper No 1. The **Extract 2** was thus obtained and stored at 4°C until analyses.
Extract 3
Distilled water (100 mL) was added to 15 g of the stem bark powder of each plant. The mixture was stirred at room temperature during 72h, and then filtered through Whatman paper No 1. The **Extract 3** was thus obtained and stored at 4°C until analyses.
2.2 Phytochemical analyses
Chemical compounds were determined using different methods described by Harborne (1973) and Wagner

(1983).
Test of **flavonoids** were realized using aqueous solution of NaOH 10% and $FeCl_3$ 2%. **Alkaloids** were determined by the Draggendorf reagent and the Bouchardât reagent. Test for **sterols** and **terpenoids** was done by the Liebermann reaction. The **reductor compounds** were characterized by the Fehling reagent. Test of **tannins** was done using Stiasny reaction and aqueous solution of lead acetate (AcOPb 10%). **Saponins** were characterized by the observation of persistent foam for 15 min after shaking the extract in a test tube.

3. Results and discussion

Results were qualitatively expressed as negative (-), positive (+) or abundant (++) and are shown in Tables 1 and 2. Thus, phytochemical screening of steam bark extracts of *Pseudospondias longifolia* showed the presence of flavonoids, alkaloids, reductor compounds, tannins and saponins (Table 1). Sterols and terpenoids were not found. The extracts of *Antrocaryon klaineanum* contain alkaloids, reductor compounds, tannins and saponins (Table 2). Flavonoids, sterols and terpenoids were not found.
Alkaloids were abundant in the *Pseudospondias logifolia* extracts compared to the extracts of *Antrocaryon klaineanum*. Alkaloids are known to have analgesic properties (Jeruto et *al*, 2011). It is found that many plants traditionally used to treat malaria contain alkaloids. Thus, the presence of alkaloids could explain the utilization of these plants against malaria. Moreover, many alkaloids can be useful against HIV infection and intestinal infections (Nacoulma, 1996).
Only *Pseudospondias longifolia* extracts contain flavonoids. The **Extract 3** seemed to be less richer in flavonoids than **Extract 1** and **Extract 2**. Flavonoids are used in traditional medicine for the treatment of microbial infections (Aboughe Angone et *al*, 2013), which may explain the use of bark of *Pseudospondias logifolia* for the treatment of dysentery or diarrhea.
The results show the abundance of tannins in all extracts. The consumption of tannin can cure or prevent a variety of ills (Serafini et *al*, 1994). Many tannins have shown to bind cell walls of bacteria, prevent growth and protease activity (Jones et *al*, 1994). Other tannins can exhibit anti-inflammatory activity (Mota et *al*, 1985; Nkeh-Chungag et *al*, 2009). The abundance of tannins explains the use of these plants for the treatment of certain pathology such as diarrhea, stomach ulcer, stomach aches and hypertension.
Test of saponins was positive in all extracts. Many studies have shown that saponins have haemolytic effects on the erythrocyte (Aboughe Angone et *al*, 2013; Francis et *al*, 2002). The reductor compounds were found in the six extracts. These compounds can exhibit anti-diabetic activity (Harborne, 1973) and can justify the use of the plants for the treatment of diabetes.

4. Conclusion

The plants studied in this paper can be seen as a potential source of useful drugs. Although alkaloids, flavonoids, tannins, saponins and reductor were detected, sterols and terpenoids were not found. Further studies are recommended on these plants to validate their therapeutic properties.

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Table 1. Chemical constituents of *Pseudospondias longifolia* steam bark extracts.

Chemical constituents	**Extract 1**	**Extract 2**	**Extract3**
Flavonoids	++	++	+
Alkaloids	++	++	++
Sterols and terpenoids	-	-	-
Reductor compounds	+	+	+
Tannins	++	++	+
Saponins	++	++	+

Table 2. Chemical constituents of *Antrocaryon klaineanum* steam bark extracts.

Chemical constituents	**Extract 1**	**Extract 2**	**Extract3**
Flavonoids	-	-	-
Alkaloids	++	++	+
Sterols and terpenoids	-	-	-
Reductor compounds	+	++	+
Tannins	++	++	++
Saponins	++	++	+